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BRITISH MUSEUM
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NATURAL HISTORY.

Lincolnshire Naturalists' Union Transactions.

1919.

Edited by
ARTHUR SMITH,
F.L.S., F.R. Met. S., F.E.S.,
AND
R. W. GOULDING,
F.S.A.

LINCOLN
Printed by CRITCH & Co., LTD.,
TENTERCROFT STREET,
1920.

Lincolnshire Naturalists' Union.

Founded June 12th, 1893.

LIST OF OFFICERS, 1920.

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Secretary:—F. Hind, Mansfield House, Skegness.

LIST OF MEMBERS.

Revised to May, 1920.

Any person wishing to withdraw from Membership of the Union must give notice in writing to the Hon. Secretary; such person, however, will be liable for the current year's subscription and any arrears that may be owing.

Any corrections in the List will be gladly received by the Secretary.

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Peacock, Miss Mabel, Wicken Tree House, Kirton-in-Lindsey
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Spurrier, Rev. H. C. M., M.A., Roughton Rectory, Woodhall Spa
STOW, Miss S. C., 26 Avenue Road, Grantham, President 1914
STOW, T., 26 Avenue Road, Grantham, President 1919
Suggitt, Robert, Suggitt's Lane, Cleethorpes
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Wintringham, W. H., The Abbey, Grimsby
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Woolward, Miss F. H., Belton, Grantham
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SUBSCRIPTIONS.

Members are reminded that Subscriptions should be paid to the Hon. Assistant Secretary, Mr. R. W. GOULDING, F.S.A., Welbeck Abbey, Worksop, who will send receipts.

The minimum Subscription is 5/-, payable in advance. The payment of one sum of £5 constitutes a life member. Those subscribing 10/6 or more receive the "Naturalist" free, if they apply by letter to the Assistant Secretary.

TRANSACTIONS.

Back Numbers of the parts issued are still on hand, and may be had from the Hon. Secretary, ARTHUR SMITH, F.L.S., etc., City and County Museum, Lincoln. Price 1s. 6d. per part.

OBJECTS AND RULES.

The Lincolnshire Naturalists' Union was formed to promote the thorough investigation of the fauna, flora, and physical features of the county, to bring together workers interested in the same pursuits, to increase the interest in, and study of, every branch of Natural History.

Field Meetings are held four or more times a year. There is also one annual general meeting held at Lincoln, for the transaction of the business of the Society, and for the President's address.

Members will be entitled to free admission to all meetings and excursions.

At ordinary Field Meetings, when the Union is not entertained, members may introduce two friends, not more, except by the President's consent.

When the Union is entertained at any Field Meeting, the Meeting is to be open to members only, except such friends as the Entertainer may invite.

Ladies and Gentlemen desirous of becoming Members of the Union should apply to the Hon. Secretary for nomination papers. A new Member requires to be proposed and seconded, and the paper must be counter-signed by the President or one of the Vice-Presidents of the Union.

Correspondence with respect to Field or Sectional Meetings and organization generally should be addressed to ARTHUR SMITH, Museum, Lincoln.

It is hoped that all Members will interest themselves in the work of the Union, especially by obtaining new members and communicating with the Sectional Officers respecting new records, etc.

NEW MEMBERS.—Members can greatly assist the Union by forwarding to the Secretary, the names of ladies and gentlemen whom they think at all likely to take an interest in the work of the Union.

Proposal Forms will be sent to any Member applying for them.

LINCOLNSHIRE NATURALISTS' UNION.

Statement of Account from 1st January to 31st December, 1919.

RECEIPTS.				£	s	d
By Balance in Bank, 31st December, 1918				68	8	2
,, Balance due from Secretary				0	12	4
,, Life Members' Donations invested in Savings' Bank	51	11	3			
Interest thereon	1	5	6			
				52	16	9
,, Members' Subscriptions including *The Naturalist*				26	7	6
,, Copies of Transactions sold				0	15	6
,, Bank Interest				0	18	5
				£149	18	8

J. S. SNEATH, *Treasurer.*

PAYMENTS.				£	s	d
To Subscriptions to *The Naturalist*				1	15	0
,, Printing and Stationery				2	8	10
,, Printing *Transactions*, 1918, and Block for Illustration				17	11	3
,, Fauna of Notts.				0	18	0
,, Postage and Stamps				3	16	11
,, Expenses of Meetings				0	17	3
,, Life Members' Donations in Savings' Bank	51	11	3			
Interest	1	5	6			
				52	16	9
,, Balance in Bank	92	5	5			
Less Unpresented Cheques	22	11	0			
	69	14	5			
Due from Secretary	0	0	3			
				69	14	8
				£149	18	8

Examined and found correct, February 3rd, 1920,
E. E. BROWN,
Auditor.

BRITISH
MUSEUM
5 DEC 21
NATURAL
HISTORY.

Sir H. C. W. HAWLEY, Bart.

The Presidents

OF THE

Lincolnshire Naturalists' Union.

Sir H. C. W. HAWLEY, Bart.

IT must be difficult for the occupant of the chair of the L.N.U. in 1916—1917 to believe that he was ever President of our Society. He was away from his native county on war-service the whole two years he held the chief position we have to offer our workers, for that is the way to put it. Other fellowships of men for various purposes do what they like in the matter, but the rule of the L.N.U. from the very first has ever been to put our chief workers into the chair of honour regardless alike of sex or age. The labouring man who has time and mental inclination to master his chosen subject thoroughly is with us in the same position as the most highly placed individual socially. Our women workers too have the same claims for the recognition of work well done, equally with their masculine protagonists in scientific drudgery. The Union's rule is that those who take the lead in field observation and discovery and forceful ecological analysis shall have the stamp of its satisfaction put on them by the offer of its Presidency. The individual initiative, however, must come in the first place, no one can be a thorough naturalist without time, sacrifice and ungrudging perseverance. "All birdmen are not Cordeauxs!" All the same, our First President was put into the chair on account of his fifty years' study of our feathered biped friends—not because of his all round gifts as a naturalist. Dr. Johnson's illustration of Edmund Burke's mental and conversational powers, was equally true of him—"If a man were to go by chance at the same time with Burke under a shed, to shun a shower, he would say—'This is an extraordinary man.'".

So Sir Henry Hawley was elected not because he was a large landowner in this county, not because he was the descendant of one of Lincolnshire's most illustrious scientific sons, Sir Joseph Banks, but because he loved to study the lowly Fungi and their complex ecology.

Born at Tumby Hall, Boston, on the 23rd December, 1876, and spending all the earlier years of his life there, he "yet took little interest in any branch of Botany, until he was leaving Magdalen College, Oxford." It was rather in 1900, when studying for the Bar, that Botany displaced with him History, as a personal interest and hobby. "An innocent 'obby 'urtful to no man," a Yorkshireman said of my collection of cross fertilising insect visitors to our plants: "Each man for his own subject, I'd sooner watch a county cricket match; there's more go and glory in it!" Each man to his gift. Find out your own and stick to it. Such seems to have been Sir Henry's idea, for Mycology as a speciality he only began to study seriously in and after 1905. "A Fungus Foray held at Lincoln under the guidance of the late Charles Crossland, F.L.S.," was one of the causes of our past President's taking up that science as a special life study. "It was Crossland's enthusiasm and thoroughness coupled with his never failing kindness that led me on, and made me a regular attendant of the Yorkshire Fungus Forays." Nothing has given me, an old friend of Crossland's, greater pleasure lately than to read these words. "I also subsequently," continues Sir Henry, "spent many happy hours at the Herbarium, Kew. There the late George Massee, and A. D. Cotton, F.L.S., were always ready to give kindly help." This was followed up in the field by much work, and several visits to Clare Island, Co. Mayo, which "finally led to my collaborating with Carleton Rea, Esq., in writing *The Monograph on Fungi for the Clare Island Survey*, published by the Royal Society of Dublin, 1911."

Since then the Great War cut short all Sir Henry's botanical studies. For being gazetted to the 8th Service Battalion of the Royal West Kent Regiment in November, 1914, he went out to France at the end of 1915, and served

with that Battalion till May, 1917. After that date he served with the Labour Corps, and was finally demobilised May 1st, 1919.

Not a bad record for one who loves peace and quiet scientific work in the glades of life rather than in its more strenuous arena. Good work in fungus ecology can only be accomplished by endless observation in the retirement of the country, it cannot be rushed like a German trench. War is one thing, exact knowledge quite another. So when Sir Henry took over the Fungus Register of the L.N.U. from Past President, Miss S. C. Stow, he knew what he was in for. This Register contained the late Rev. Canon W. Fowler's records, and those of other early workers. He adds in a letter to me in regard to it: "I have, I believe, a pretty complete record of the Lincolnshire Fungi hitherto noted. Unfortunately, like nearly everything else of mine, it is stored, and not to be got at for the present, but I still hope to have a settled abode by the Spring of 1920." We as a field working society, hope that the Register will still grow by accretion under Sir Henry's competent hands. Also, even later still, when it is printed in the Transactions of the L.N.U., we hope to have the ecology of the fungi explained down to our understanding as a Society.

E.A.W.P.

The Editors desire to explain to the Members of the Lincolnshire Naturalists' Union that it has been necessary to change the printers of the *Transactions*. The present part is issued as the commencing portion of a new volume, the type being somewhat different to preceding parts. It is considered that the smallness of the last volume is not out of keeping with the times during which they were issued.

A Title page and index will shortly be distributed. The *Transactions* for 1919 is a larger part than usual containing articles recording important work done in the County, and which the members at the Annual Meeting expressed a desire should be printed as soon as possible.

THE GENERAL SECRETARY'S REPORT, 1919.

I am pleased to state that the naturalists of the county continue to support the Union, and that the names of several new members have been added to our Register.

Three Field Meetings were held during the year, with results that were deemed quite satisfactory.

The One Hundredth Meeting took place at Scotton Common, on Tuesday, 24th June, 1919.

The One-Hundred-and-First Meeting was convened at Ancaster, on the 22nd July. It proved to be full of interest, and the members had the advantage of being conducted by the President (Mr. T. Stow) and Mr. H. Preston. Many botanical records were made. Eighteen species of Land Shells were found; and many Insects were taken, including specimens of the Marbled White Butterfly and the Dark Green Fritillary.

The One Hundred-and-Second Meeting was held at Melton Ross, on September 3rd, under the leadership of the Rev. G. F. Casswell. In spite of very unpleasant weather, many records were made. *Vertigo pygmaea* was found in the grounds of the Parsonage, and a sub-scalariform *Helix aspersa* was taken in the Quarry.

The thanks of the Union are due to those who ably assisted in organizing and conducting these Meetings, and to the Rev. G. F. Casswell for the hospitality which he extended to those members who attended the meeting at Melton Ross.

It is with great and sincere regret that I advert to the loss which the Union has sustained by the death of Mr. W. Denison Roebuck, of whom an obituary notice, from the pen of Mr. J. F. Musham, appeared in the last part of the Transactions. Mr. Roebuck was one of our best and most thorough workers; he was one of the ablest conchologists in the country, and it was well-known that for many years he had been making collections with a view to the composition of a monograph on the Non-Marine Mollusca of

Lincolnshire. It is greatly regretted that he did not live to finish this work, to which he had devoted so much time and study. On hearing of his decease I sent, on behalf of the members of the Union, a message of condolence to Miss Roebuck.

The Annual Meeting was held at Lincoln, on the 13th November, 1919. Mr. J. F. Musham, F.E.S., was elected President for the year 1920, and the Rev. F. S. Alston, M.A., Vice-President. After the reading of the reports of the Sectional Secretaries, the following resolution was proposed and passed:—

> "That all Registers made by the Sectional Officers be the property of the Union, and that the said Registers be placed at the disposal of the General Secretary and Editors of the Transactions for publication."

The Secretary was authorised to revise the list of Sectional Officers.

I should particularly like to direct the attention of members to the study of *Marine Zoology*, as hitherto we have had but few workers in this branch of Natural History. It is desirable that there should be a much more minute investigation of the long line of sea-coast and estuaries of the county, and it is hoped that members will take all opportunities they may have of sending material for analysis to the Museum, Lincoln. Mr. F. Hind, of Skegness, and I have undertaken to superintend this section for the time being, and we shall appreciate the help of our fellow-members. Tangles of seaweed and zoophytes, shells, collections of small drift and any other objects will be welcomed at the Museum. All such consignments will receive careful examination, and our county lists may receive many accessions in consequence.

Speaking generally, I would appeal to members to collect specimens in all branches, and to forward the same to the various Sectional Officers for determination. If they will do this, they will certainly be helping to extend our knowledge of the distribution of species in the county.

SECTIONAL OFFICERS' REPORTS, 1919.

BOTANICAL REPORT.

REV. E. ADRIAN WOODRUFFE-PEACOCK, F.L.S.

Seed Dispersal.

Floral work has gone on steadily throughout the year, and as I could report more than we have space to give, I think it advisable to confine my remarks to one limited subject which can be followed up by true workers, especially during the winter months. I now refer only to a series of conspicuous species, trees or bushes, or other large plants, in which seed carriage is easily observed and studied. I do this in order to get others to aid me in my observations and records for the future flora, which will not be delayed much longer. I should like to hear from anyone who will assist me.

First I must make some preliminary remarks. These are the forms of long-distance bird carriage I have personally met with, and I do not remember to have seen any others referred to in print.

Table of Methods of Transportal by Birds.

I. Internal Seed-Carriage.
   1. In the Crop.
   2. In the Gizzard.
   3. In the Alimentary Canal.

II. External Seed Carriage.
   4. In mud.
   5. In clay-balls.
   6. Amid ruffled feathers.
   7. By mucosity.

III. External Portion of Plant-Carriage.
   8 On the backs.
   9. Round the necks.
   10. On the feet.

These summarised ways explain themselves, excepting in the case of the first three. Seeds from all these may be scattered by voiding in the usual way, or they may be regurgitated from the crop and gizzard, as yew berries

are in the case of the Song-Thrush. This is *Direct Bird-Carriage*. *Collateral Bird-Carriage* arises when seeds from the crop, gizzard and alimentary-canal are scattered, as when a Peregrine-Falcon tears up a Ring-dove, or a Sparrow Hawk a Blackbird. *Collateral Bird-Mammal-Carriage* is the same, as when a Stoat carries off a Fieldfare to eat in its lair and scatters the seeds. *Secondary Bird-Carriage* is a much rarer thing, as when the Barn-Owl swallows a Song-Thrush whole early in the evening, and the seeds of the White-Thorn are regurgitated in its pellets full of vitality should they be lucky enough to meet with a fitting nidus. There are such things I find as *Direct* and *Secondary-Fish-Carriage* of seed, but into this I have never gone fully, but it is certainly in action even in Lincolnshire.

There are two great lines of Bird-Migration in Lincolnshire: (1) Along the seashore, and (2) down the valley of the river Trent; this latter is the one on which I have done most of my observation. There are, however, two other distinct lines: (3) just along or below the wold escarpment; and also (4) that of the cliff range of hills. These latter two are especially followed by moorland fowl, such as the Ring-Ouzel and Waxwing. There is also a widely scattered general migration, which any one can notice in spring who takes interest in such matters. When there are strong East or North-Easterly gales in March and April, we have migrants scattered over the whole county without regard to migration lines, awaiting the opportunity of a better change of weather to move on. Such a time *may* have given us the seedling Figtree (*Ficus Carica*), as it is on our chief line of migration—the coast one.

In the same way birds are often held up in the autumn by South-Westerly gales, which have suddenly sprung up after or just before the migrants have arrived on our coast line. At such times the whole country is more or less covered with common or at times rare species, giving us at Cadney more than four times our usual bird supply, because they could not, or did not care to face the lashing storm gusts from the Atlantic Ocean. Perhaps it was such a time as this that left us the Stone-Bramble on our coast

shingle. There is one combination of circumstances in which migrant birds are in still greater numbers, often blackening the pastures by day and the woods at night in countless masses. This is from two to three days, more often the former than the latter number, before the approach of prolonged snow-frosts of intensity from the North-East. Never, however, to the same extent before those which come from the South-West, though these latter have been the deepest frosts I have ever experienced in Lincolnshire. Every storm of this kind, from whatever quarter it has approached, has left some mark on our flora, especially in woods, coverts, hedges and field ponds, which I have been able to pick up, thanks to my method of annual rock soil recording, as, to give an instance of single specimens of *Tilia vulgaris* and *Rhamnus catharticus* and many *Acer campestre* in Poolthorn covert. I have talked over the whole question fully with my kind friend, the late John Cordeaux, whose knowledge of our shore-migrants was then unequalled. Yet, I only refer here to these migration lines under one clear and explicit condition, *i.e.* when species, which from their soil requirements, etc., might have a wide range in this country, are now confined to strictly limited areas on well-recognised "bird-roads," as our old Ring-dove shooters called them. I am not a specially trained ornithologist and must leave this particular line of observation to the more ecological bird-men. May I be allowed to ask here, why the gizzards and alimentary canals of all rare migrants, which fall into their hands, are not searched for seeds? The crops are in my experience always empty, but the gizzards and intestines are never so, and much of the information in this paper is from them.

To save print and paper I use a number of family names for the birds. The *Anatids* are the Geese and Ducks. The *Columbids* are the dove-family. The *Corvids* are the Raven, Rook, Crows, Magpie and Jay. The *Larids* are the Terns and true Gulls. The *Phasianids* are the Pheasant, Common and Red-legged-Partridges and the Quail. The *Stercorariids* are the Skuas, which are great moor-berry eaters, as well as Collateral-and-Secondary-Bird-Carriage sowers. The *Tetraonids* are the heath fowl—the Caper-

caillie, Black and Red-Grouse, and Ptarmigan. Finally the *Turdi* are the Blackbird, Mistle and Song Thrushes, Fieldfare, Redwing and Ring Ouzel. All these birds are great seed sowers by *Direct, Collateral*, or *Secondary-Bird-Carriage*. Of our purely local birds, the Blackbird is the best species to study for alimentary canal carriage. It has the peculiar gift of flying on to special places, as posts or rails, time after time, and then voiding as it looks round. The result is that a whole succession of seeds may be procured the season through by the careful observer from one single bird. They will perhaps begin with the Strawberry or Raspberry or Currant or Gooseberry or Elder, and go on through the season with the White-Thorn, Yew, Cotoneaster and Holly, to end with the Purging-Buckthorn. There is nothing displeasing in this work, only in the idea of it, when the droppings are slipped by a pair of forceps into paper bags made to receive them, and are properly dried before being rolled between tissue paper to crumble them for analysis.

As all seeds are sown locally by wind carriage, I but merely refer to this method of transport in these notes.

My floatation and Azores notes are from my kind correspondent Dr. H. B. Guppy, or his works: *Plant Dispersal*, 1906 (*i.e.* the 2nd volume of *Observations of a Naturalist in The Pacific between* 1896 *and* 1899), and his *Plants, Seeds, and Currants in the West Indies and Azores*, 1917. These preliminary matters having been outlined, the following are my selected notes.

The Larch (*Larix decidua* or *europaea*) is water carried, but never to live in my experience. It is sown also by Squirrels storing its cones on or in the ground, *beyond the shade of the parent trees.* This is a peculiar trick of this mammal which causes woods of certain species, when they are permitted, steadily to extend in *all* directions, and not as by wind carriage in this climate to the N. and N.E. only. It is also sown by the Crossbill feeding on the seeds and scattering them, but only very locally.

The Yew (*Taxus baccata*) is sown by the Long-Tailed-Field-Mouse carrying off the berries to feed on them; its

work is very characteristic, and in my experience it has never eaten all it has collected. The following birds feed on them too: Pheasant, Mistle and Song Thrushes, Blackbird, Ring Ouzel, Waxwing, Nuthatch, Hawfinch, Greenfinch, and Bullfinch. They are both passed and regurgitated, I know; and are sown also by collateral bird-mammal-carriage—of the Blackbird and Stoat.

The Scotch Pine (*Pinus sylvestris*) is carried and scattered by the Squirrel, Bank Vole, and Long-Tailed-Field-Mouse. By the following birds too: The Raven, Rook, Nutcracker, Jay, Ring Dove, Stock Dove, and Turtle Dove, Common, Parrot, and Two-Barred Crossbills, Waxwing, Tree-Creeper, Bullfinch, Hawfinch, Goldfinch, and Marsh Tit. It is water borne, but never to live I find.

The Juniper (*Juniperus communis*) is only found with us in one place in the Trent Valley, on the migration line of moorland birds, by alimentary canal carriage, no doubt. The following birds feed on its cones and seeds: Grouse, both Black and Red, Mistle and Song Thrushes, Ring Ouzels and Waxwings. All these species have been shot in the Trent Valley, and bar the two first and last are annually with us on migration.

The Reed-Maces or Bull-rushes (*Typha latifolia* and *T. angustifolia*, and their hybrids both ways) are carried by the Wild Ducks or other Anatids only, so far as I can make out, and I have had many opportunities of studying this subject—by alimentary-canal-carriage, I judge, but am not certain. I have seen their seed on the muddy feet of cattle, but have no proof of this mode of sowing as yet, also on my own boots.

The Butchers-Broom (*Ruscus aculeatus*) flowers on February 8th, taking a mean date near Cambridge from the Blomefield (=Jenys)—Darwin *Naturalists' Calendar*, 1903. It never ripens its seed, and so is a planted outsider with us, for the simple reason it is dioecious, and both sexes have never been planted together in Lincolnshire to my knowledge. I have studied it in the South near London and elsewhere. It is bird-carried, but by what species I do not certainly know, but judge the Blackbird from what I have seen.

The Black-Bryony (*Tamus communis*) is only sown here by the Blackbird, so far as I have yet certainly discovered. I have been told, however, other *Turdi* and the Pheasant do their part.

The Poplars (*Populus* species) are wind sown, aided by wet or muddy feet and boots. The Willows and Sallows (*Salix* species) are the same, mammal hair, and human clothing even, taking a part in their distri bution; but, as in the case of the Poplars, I have never seen birds eating their seeds.

The Sweet Gale (*Myrica Gale*) has given me endless trouble with, as yet, little tangible result. Its seeds may be found in the crops of Grouse, both Black and Red. It is only found with us on the migration lines of the moorland *Turdi*. Another species, *M. Faga*, Ait., has been bird carried to the Azores. Some one else must study this subject out, I am now too old for it.

The Walnut (*Juglans regia*) is more within my limited powers now. As we all know, it is not a native species, yet the Raven, Carrion-Crow and Rook bury the nut in moss and under tussocks of grass, under cassons or cow-claps in pasture, for future use in winter time, just as Rooks do acorns every season there are any. As yet I have never known one of these hidden treasures to grow, they are too well remembered and used in snow frosts !

The Hornbeam (*Carpinus Betulus*), another planted outsider in Lincolnshire, has its seed scattered and eaten by the Hawfinch. This bird is quite a late arrival with us as a breeding species in this country, 1880 to 1890. I first had young sent me in 1886.

The Hazel-nut (*Corylus Avellana*) is blessed with many admirers. It floats from one to four weeks in water, yet though I have always found it in river and beck alluviums, which drain *Corylus* districts, I have never known it water-carried to live. Squirrels bury them in moss and rough grass in wood rides, but, more generally, as if they reflected, which they certainly do not, beyond the line of the grove's existing extension. The Long-Tailed-Field-Mice store them underground, and do not use all their accumulations, and nut

clusters often spring up from their winter homes. This is equally the case with the Hazel-nut's foreign variety, the Filbert (*Corylus Avellana*, v. *grandis*). The Common Rat also stores them underground, but I have never yet personally met with a case; but I have known both Squirrels and Rats store them in fences in abandoned *Turdi* nests. Among birds, the Raven, Rook and Jackdaw, Magpie and Jay, hide them, too, in and round woods and groves. They are crop-carried also by the Pheasants, Nutcrackers, and Ring, and Stock Doves. The Nuthatch, Greater and Lesser Spotted, and Green Woodpeckers and Great Tit all carry them about in order to find fitting clefts, chinks, and cracks to fix them in for opening; so also, no doubt, do other birds of which I have no notes as yet. Observation of their action is a work of time, and short though these notes on the Hazel-nut are, there are over fifty years' work in them, for in the woods around my old home at Bottesford it was a native species on the Lower-Lias-Clay.

The Birches (*Betula alba* and *B. tomentosa*) are nearly always wind sown. They are water-carried also, but not to survive, so far as I know. They are carried by hair, feathers, feet, boots, and human clothing; and I have found them in the crops of the Pheasant, Siskin and Lesser Redpoll.

The Alder (*Alnus glutinosa* or *rotundifolia*) is water-carried, and I have no doubt survives it, but this Cadney district is not an Alder one, so I have no personal experience. Its seeds float for twelve months. It is Wild Duck carried, but whether internally or externally, or both, I cannot say. The Black Grouse, Common Crossbill, Common Redpoll and Siskin, are all recorded as feeding on them. I regret much I have had no chance of properly studying this species since I was a child.

The Beech (*Fagus sylvatica*) I have had ample opportunities to study. Its seeds are eaten by Hares and Rabbits, but I should not judge are ever sown by them. The Squirrel, Common Rat, and Long-Tailed-Field-Mouse store them underground, as well as in holes in trees, old *Turdi* nests and in rough pasture grass and moss. They are water-carried

but never to live so far as I yet know. The Raven, Rook, Jackdaw, Jay, Magpie and Nutcracker, all eat and bury them. I have notes of them in the crops of Pheasants, Common and Red-legged Partridges, Ring, Stock, Rock, and Turtle Doves. Other birds that feed on them are the Green, Greater, and Lesser Spotted Woodpeckers, Nuthatch, Hawfinch, Siskin, Brambling, Mountain Finch, Blue and Cole Tits. With this species I have observed Collateral-Bird-Carriage from the crops of the Pheasant and Ring Dove, killed by the Peregrine Falcon; and the late Rev. H. C. Brewster, of South Kelsey, made similar observations the same season in that parish. No doubt this was the work of the same bird which frequented the Ancholme level in the winter of 1899—1900. My son saw it stoop at a nearly fully grown leveret.

The Spanish Chestnut (*Castanea sativa*) is an introduced foreigner. Yet in very long and dry summers like 1868, 1887, 1893, and many since this last date, it has ripened its seeds, and trees have grown from them, as at Twigmoor on Blown-Sand. I have notes from others that the nuts are eaten by Pheasant, Ring Dove and Rooks, and that the last bird stores them. In the case of this species I have no proof of mammal carriage yet, for we have so little of it in North Lincolnshire, that I have never known it in beck or river drift, and it meant a drive, or in my case then, a walk of twenty miles to study it. Driving, or even the bicycle, are no good, if you want to observe.

The seeds of the Oaks (*Quercus pedunculata* and *Q. sessiliflora*) are water carried, but never to grow to my knowledge. I have often taken them sprouted from alluviums, but I think they were picked up by the floods which carried them *after they had sprouted.* The Squirrel, Common Rat, and Long-Tailed-Field-Mouse store and bury them underground, above ground, and in old dreys and *Turdi* nests. Ravens and Rooks bury them in moss and rough grass or under cow-claps in pasture, and store them in their own nests for winter food. Turkeys, Pheasants, Ring, and Stock Doves and the Nutcracker, eat them whole, while Jays, Magpies, the Green and Greater Spotted Woodpeckers and Nuthatch

feed on them; and in doing so carry them about, as I have observed. I noted, 18/9/1918, three young oaks growing by the side of a hedge, out of the abandoned store of the Long-Tailed-Field-Mouse. The nearest tree was just over 300 yards away. Again, 19/8/1918, from the crop of 1916, I came on two fine grown young seedlings in a meadow, Rook hidden, sown and lost in the deep snow frost of 1916—17.

The Wych Elm (*Ulmus montana*) seeds are water-carried, but for no distance to live, I find. Rooks peck at and eat the fresh flowers in spring, but I have never known them eat its seed. They seem to be purely wind sown. In season 1909 there was the greatest seeding I have any notes of in all situations and on all soils. It was a wonderful sight. The trees at Cadney on their Sandy-Glacial-Gravel, lying on Oxford Clay, were weighed down with fruit, and as a natural result from such over-production in one season, the leafage was very small, thin and poor; I have never seen *Ulmus* or any other trees in such a state. I perceived Chaffinches and Linnets feeding on the seeds, and rejecting their wings, but not moving them to any distance. This the winds alone did so far as I could discover, except the wet and muddy feet of animals and the boots of man, which carried them for miles—Direct animal-and-man-carriage shall we call it?

The Southern or Lusitanian Elm (*Ulmus campestris*) flowers in some seasons, as in 1868 and 1909, plentifully; but I have never myself seen a seedling naturally growing up-to-date. I have a note of 1909, "Seeds falling, but not ripe." It is not a woodland species, for it cannot "canopy" or grow a "cabbage-head," and so is always planted or grows along hedges from root suckers. There are plenty of *U. montana* × *campestris* hybrids, but I have never made a special study of them, or seen the opposite hybrid.

The Hop (*Humulus Lupulus*) was first introduced into England in 1524, to take the place of Mugwort (*Artemisia vulgaris*) and other species as a flavouring for beer. I can easily prove that it is water-carried in Holme, on Bottesford beck, and in Bigby, on a branch of Keelby beck. Yet,

I have never seen ripe nuts in Lincolnshire, and have no notes of the distribution of the male and female plants even, for this species is dioecious; and I am not in a position to say whether it is seed carried or root carried to the spots I have found it in, where it was certainly never grown in hop-gardens. I want all the information I can gather about the fruiting of the Hop in Lincolnshire, for it produces perfect nuts in Yorkshire !

The Mistletoe (*Viscum album*) is a native, if rare, plant in Lincolnshire now. Except in Grimsthorpe Park where it is bird-sown all over the place, on Whitethorn, Elm, Ash and Poplar, it can only be called rare with us. I have only proof of the *Turdi*, especially the Mistle or Mistletoe-Thrush, eating and sowing it, with the single exception of the Waxwing, for it has been found in its crop. I have proof, however, that a labouring man at Howsham, about 1888 bought some in berry for "Christmasing," and threw it out into his garden as soon as the festival was over. A *Turdid* of some species, the Blackbird there most probably, from my knowledge of our local birds, took all the berries, and sowed one on the man's apple tree where it was when I last looked for it. Down in Kent I have watched the Mistle-Thrushes sowing it, especially on high Poplars (*Populus nigra*) by cleaning their bills after feeding on its berries. I have grown it frequently by artificial sowing—there is one plant on an apple in Pye-House orchard at Cadney that I sowed early in 1892. The reason of my repeated failures I find is that the Blue Tits tear off the seeds in order to find insect life below them. The tops of higher trees like *P. nigra* are rarely frequented by these birds. I had to sow fifty seeds at once to discover the bird that pulled them off so systematically.

The Sea-Buckthorn (*Hippophae Rhamnoides*) has been recorded regularly for our coast meals since 1669, but never have I been able to learn, nor is there in literature known to me, any information regarding birds that feed on its seeds. Can any Louth or coast worker tell me? I have huge bushes here up to twelve feet high, in Cadney House

garden, but I have never known seeds in 29 seasons; perhaps they require sea-salt in the air for fertilisation. This is not a dioecious species. It should be studied specially by the Louth botanists in autumn. Since this was written, I have heard of the Bullfinch and Ring Ouzel.

The Daphnes (*D. Laureola* and *D. Mezereum*) are both sown by *Turdi*, the Blackbird especially, but I have seen the Song Thrush doing its part as well with *Laureola*. This is not so with the *Mezereum*. I have sixty or more plants of *Laureola* in this parish, and *Mezereum* is just as freely grown in gardens by boot-carriage apparently, but seems to be rarely sown with us in the open. In the whole county I have only two cases of it as bird-sown in woods, and only one note of a Blackbird eating its fruit. To judge by looks, *Mezereum* is more attractive than *Laureola*, but as a matter of fact it is not so. Since this was written for the L.N.U. *Transactions*, I find a note in my diary, 5/3/20, the Laurustinus (*Viburnum Tinus*) of gardens, produces small black berries, which are fertile. When these are eaten by *Turdi* they inflame the mouth, like those of *D. Mezereum*. This is why birds so rarely sow the berries of *D. Mezereum*, while those of *D. Laureola*, which have not this acrid principle, are freely sown all over by the *Turdi*.

The Privet (*Ligustrum vulgare*) seed is beloved by the Bullfinch, as well as the Partridge, Garden Warbler and Song Thrush and other *Turdi*. It is to be found sown in woods and hedges, and on our coast meals by them, I judge, along with the Whitethorn.

The Ash (*Fraxinus excelsior*) is annually water-carried but never to survive. It is wind-carried for short distances, but not usually blown far by gales along the ground excepting on roads and other man-made open spaces without vegetation. It is also carried by wet and muddy feet and boots. Very rarely it gets under the feathers of Pheasants or other large birds; but it is never eaten, so far as I know. I have never found traces of it in their crops in the worst snow-frosts, though plenty might be hanging on the trees, and have never seen a single bird feeding on them in any circumstances. If other things were

equal, such as climate and soils, which of course they are not now, as our climate once was, *Fagus* would knock out *Fraxinus* quite easily.

The Sycamore is easily twice as good a self-sowing species as the Ash is to day; but as we are situated at present the Ash is an extending species, more so than *Quercus*, which is suffering from toxic-atrophy only too often, and *Fagus* which is the same to a certain extent, but suffers still more from the steadily growing chill of our climate. This war has brought the Sycamore to the front in the most striking way in value, and as it has a wider range of soils and a better gift for self-sowing than *Fraxinus*, the future may give it a chance. Here at Cadney, by counting just as they come, I find on Sandy-Glacial-Gravel and Chalky-Boulder-Clay alike, there are seven seedling Sycamores to one seedling Ash, from an equal number of parent trees.

The Bilberry (*Vaccinium Myrtillus*) is bird-sown in fresh spots by alimentary-canal-carriage. I have seen or heard of it in the crops of Tetraonids, and moorland *Turdi*, as also the Waxwing. This is one of our rarest species, not naturally so, but only because it is so much beloved by our abounding Rabbits, that it is eaten to death where the Rabbit is found. It only now survives on one known spot on the cliff migration line.

The Cranberry (*Oxycoccus quadri-petalus*) was practically confined with us in the past, as now, to well recognised flight-lines of the shore, cliff, and Trent. It is nearly extinct with us by drainage and desiccation. Curlew, Tetraonids, *Turdi*, *Lari*, Anatids, and other frugivorous fowl feed on it, I have no doubt, but as yet I have no certain proof in every case.

The Honeysuckle (*Lonicera Periclymenum*) is a purely bird-sown species generally by alimentary-canal-carriage. Yet I have but few notes of fowl taking its ripe fruit, though I have watched most carefully. All Phasianids, with the exception of the Quail, do, as well as our garden *Turdi*, the Redbreast and Cole Tit. The Perfoliate Honeysuckle (*L. caprifolium*) is also Blackbird sown, too, I know, from viewing these birds feeding on its seed; but I have never

heard of it growing in the open in this county. Yet, the much more uncommon species in gardens, the Fly Honeysuckle (*L. Xylosteum*) has been met with, and is most certainly Blackbird sown.

The wild Guelder-Rose (*Viburnum Opulus*) is water-carried on all our becks, but not to live, so far as I know. It is eaten by all the *Turdi*, common Columbids and Waxwings. It was not used in planting Poolthorn covert in 1797, but it is there to-day, only on the Very-Chalky-Boulder-Clay soil—not on the Kimeridge-Clay; and after the great frosts of 1895, 1916—17, and 1917—18, as there were no *Turdi* left to eat them, the berries in their loveliest glory of colour were on the bushes till they fell on to the ground for the Pheasants to eat, or until the migrant over-sea *Columbids* of late October cleared them off at once. The Wayfaring Tree (*V. Lantana*) has also been sown with us from gardens by *Turdi*; and V. *Tinus* has been carried in the alimentary canal to the Azores.

The Elder (*Sambucus nigra*) is practically always sown by the Starling, though other species such as Pheasant, Partridge, Quail, Blackbird, Redstart, Wryneck, Stonechat, Nightingale, Robin, Blackcap, Reed, Sedge, and Garden Warblers and Whitethroats are all recorded as lovers of its fruit and seed, and, no doubt, take a trifling part in its sowing. It is one of the curses of the modern low-cut agricultural fences, but in the old high ones of my earliest days it was very soon over-shaded and smothered, as I have often recorded it was in the few surviving high hedges, which existed in this neighbourhood, when I came to Cadney in 1891. It can survive water-carriage for short distances, I believe, but my evidence is curiously conflicting as yet, on account of alimentary-canal-sowing over the whole land and water area of this parish by Starlings.

The Danewort (*Sambucus Ebulus*) forms part of the food of Pheasant, Blackbird, Starling, and Blackcap. There is none in this district, and I have not been able to study it properly, but the late Canon W. Fowler showed me it at Liversedge, Yorkshire, where it was most certainly bird-sown in a fence; and I have no doubt it reached Lincoln-

shire by the same means, as it is in hedges, for it is on well recognised lines of migration, the coast, wold, cliff, and Trent in five localities. I do not learn that it was ever associated with the Danes in any way. It has been with us in Lincolnshire certainly since 1688 (Plukenet's time). Has it now obtained indigenity or nativeness? I know what areality is ! I can say the Danewort is not areal yet with us, as the Elder is and has been for ages apparently!

The Ivy (*Hedera Helix*) relies much if not wholly, as I believe, on birds for distribution. My list contains all the Common *Turdi*, *Columbids*, *Phasianids*, as well as Turkeys, Domestic Fowls, Redbreasts, Blackcaps, and Garden Warblers. The Blackbird and other *Turdi* often regurgitate the seeds from their gizzards before drinking, but the sowing which ends in growth generally is mostly distributed by alimentary-canal-carriage. In this way it has reached the Azores. A point worth notice is that I have never known Starlings eat the Ivy Berries, and on or round old buildings I have never known seedlings, unless there was a Blackbird tail-flirting station on them !

The Barberry (*Berberis vulgaris*) is sown by *Turdi* and I am told by other species. Its cleaned seeds are rarely regurgitated from the gizzard, but more often pass through the alimentary-canal. As those of *B. Mahonia*, *B. Darwinii*, and *Cotoneaster horizontalis* and *C. microphylla* do to my knowledge too.

The Whitethorns (*Crataegus Oxyacantha* and *C. Oxyacanthoides*) are universal favourites with both mammals and birds. Here are my fifty years' notes, and I have reason to believe that I have not jotted down everything I have seen with all my care and note-making. The berries are eaten in snow-frosts by Hares, Rabbits, the Long-Tailed-Field-Mouse, and Common Bank and Water Voles. Though birds of or below the size of the Song Thrush generally regurgitate the cleaned seeds from their gizzards, most of the sowing is done through the alimentary-canal by Turkeys, Fowls, Phasianids, Larides, and Stercorariids in long snow-frosts, as well as by Corvids and *Turdi*, To these I can add the Starling, Common Crossbill, Bullfinch, Hawfinch, Greenfinch, and Goldfinch, as well as

Marsh and Long-tailed Tits in "pining frosts." I have seen Collerateral-Bird-Carriage in a Blackbird killed by the Sparrow Hawk, I believe, and also in the Ring Dove cut down by the Peregrine Falcon; also Collateral Bird-Mammal Carriage in the Blackbird and other common *Turdi* and the Stoat, and Secondary-Bird-Carriage in the case of the Blackbird and Barn-Owl. The Whitethorn seeds are wind carried in their "pulp," especially blown along roads for long distances, as they are also after being voided or regurgitated. They are water-carried, too, by tens of thousands down our becks, but never so far as I know to live. I have found the seeds in "pulp," or "cleaned" in mud from boots, and have seen them mud-stuck to the feet of horses and cows.

The Gooseberries (*Ribes Grossularia* and its varieties) are eaten by Foxes, which also love Strawberries! It is possible that they sow them, as both these species sooner or later reach planted fox coverts, as at Poolthorn, in Cadney, regardless of the soils they are on? My bird notes for the species are not long: the Partridge very rarely, Blackbirds, Song Thrush and Ring Ouzel, Starling rarely, Redstart, Bullfinch and Whitethroat. This is the best species for a young student to begin making notes on, as bushes are found in hedges, or pollards of all kinds, round our villages, as well as in more distant woods and coverts, where in open spots they form perfect brakes by the outer and lowest branches rooting in the ground to grow up into new bushes.

The Black Currants (*Ribes nigrum* and varieties) are sown by Blackbirds in woods, coverts and on willow pollards. I have never known any other bird touch it.

The Red Currants (*Ribes rubrum* and varieties) have a much longer list of bird lovers, including the Partridge (rare), Blackbird, Song Thrush, Ring Ouzel, Redbreast, Garden Warbler, Whitethroat, Lesser Whitethroat, and Wren. When I was a boy, no birds touched the "White" or "Yellow Currants" in the Bottesford Manor garden, and I had to wait for nearly fifty years before I found it, Blackbird sown, in the head of a pollard willow here. The Red Currant is not common in hedges, like the Goose-

berry, round villages, but I have noted it on many pollards and in woods. There also in open spots it forms thickets by branch rooting like the Gooseberry, but never quite to the same extent. My *R. sanguineum* in the garden at Cadney is visited by Blackbirds and Song Thrushes for its fruit; perhaps it does not fully ripen its seeds, for I have never yet found it growing in the open. I have never yet heard of the seeds of *Ribes alpinum* in birds' crops, and as yet even have no type seeds in my collection, though it is growing in a garden at Howsham. Can anyone send me its ripe or dried seeds?

The Crab Apple (*Pyrus Malus* v. *acerba*) is water-carried in big floods the county over, as I have often observed. Horses, cows, pigs, and even sheep eat the fruit, and, no doubt, some seeds are sown, as they are plentiful on sewage farms, with the Tomato (*Lycopersicum esculentum*) from human alimentary-canal-carriage. The Wild Apple is also carried and perhaps sown by the Common Rat. Rooks carry off the smaller kinds to their old nests to store them for winter use and periods of snow-frosts.

The Garden Apple (*Pyrus hortensis* or *domestica*) is as the last, with the addition that Starlings (I have seen one at work again to-day, 12.12.1919) of late years have taken to feeding on them, as well as Blackbirds; at Howsham I saw one doing so on the above date, too; and on 14.10.1919, I took a pip from a Song Thrush regurgitation, which also contained one Yewberry with much Yewberry pulp. I have no doubt this single Yewberry caused the regurgitation, as they are deadly poison to some birds. I have notes of Crossbills, Bullfinches, and Garden Warblers also feeding on them.

The Hybrid Apple (*Pyrus mitis* or *P. Malus* × *hortensis*) is sown by man throwing away cores, and by his alimentary-canal-carriage, as also by man's field-stock as under *P. Malus*. The way to get a fruitful orchard is to give it a hedge of wild apples, with a range of flowering from the earliest to the latest forms, for *Pyrus* is not self-fertile, or is very poorly self-fertile!

The Pear (*Pyrus communis*) is attacked here by the Rook, Blackbird, Starling, Blackcap and Garden Warbler. Whether any of these birds ever sow it abroad in this county, I have no direct proof as yet, for it is very rare in Lincolnshire as a species of the open. I believe that these arise from the throwing away of cores.

The Wickentree (*Pyrus aucuparia*) berries are eaten by all our *Turdi*, Greater Spotted Woodpecker, Bullfinch, Chaffinch, Stonechat, Blackcap, Spotted Fly Catcher and Garden Warbler. It was one of the more commonly sown species in this place in pollards when I first came to Cadney in 1891, and it would be now had not most of these willows decayed. It was the same, too, at Bottesford fifty years ago, but there, also, the *Salix alba* pollards have gone. There is one ancient Wickentree still left in a fence on the Carr-Peat at Cadney; it is the last of its race, having outlived even a Birch (*Betula alba*) which was alive when I came here—now only Oaks are left of the Ancient woods of this peaty soil; and from this one tree our local supply of seeds came by bird-carriage till they were finally established in the village area, the late Henry Trevor told me.

The Glen-Sorb (*Pyrus pinnatifida*) which itself is a fertile hybrid, I believe, was sown at Bottesford from the Manor House garden by Blackbird, Ring Ouzels and other *Turdi* in and after 1868. It was the bird-sowing of this species and the Gean by Blackbirds and Ring Ouzels which started me on these long seed distribution enquiries. My notes for the White Beam (*Pyrus aria*) are just the same; and those for the Service-Tree (*Pyrus torminalis*) too, only the Mistle Thrush has been added as a special sower to its list. Yet all these notes were made quite independently of one another.

The Blackberries (*Rubus fruticosus* species) I will lump together. I have seen dog-coat-carriage in these species. They are shore, meal, and shingle species by bird-carriage, and have been carried to the Azores. They are eaten, and no doubt sown by the Pheasant, Carrion Crow, Partridge, Blackbird, Song Thrush, Fieldfare, Ring-Ouzel, Redstart, Whitethroat, Lesser Whitethroat,

and Blackcap. Water carries them by thousands, but never to live, and in autumn they are wet and muddy feet and boot carried.

The Raspberry (*Rubus idaeus*) has practically the same bird list, with the Redbreast added.

The Dewberry (*Rubus caesius*) has not supplied me with a single bird note, I find, but, no doubt it is like the others. Cows when newly led out into a pasture where it grows will at times eat it in fully ripe fruit, but whether they sow it is doubtful, for all the Rubi rely on bird carriage!

The cut-leaved Raspberry (*Rubus lacinatus*) has been Blackbird sown, I suppose from private gardens, but I do not know a single garden where it is cultivated, and curiously enough they are on well-known migration lines, in two places in this county. Where is this species' native home?

The Stone-Bramble (*Rubus saxatilis*) is on the cliff, and was or is still on our coast line of migration. At Broughton, young Blackbirds of the year were eating it in 1893, along with the Wild Strawberry (*Fragaria vesca*).

The Roses (*Rosa* species) are water-carried to live for short distances, but how far I cannot say. They are wind-carried on roads, and man-maintained cleared spots, in the hip and later as scattered seeds. They are carried some distance to be eaten in old *Turdi* nests and such places by the Long-Tailed Field Mouse, and they are also wet and muddy feet and boot sown. Practically they rely almost wholly on birds for distribution, for the Pheasant, Partridge, Rook, Mistle Thrush, Blackbird, Song Thrush, Fieldfare rarely, Waxwing, Bullfinch and Redbreast are in my present list. They are often, I find, sown when the birds go to drink by regurgitation from the gizzard, but more often through the alimentary canal to survive. They are found on our coast meals by this form of carriage, too. Other roses, like *Rosa spinosissima* at Newton Cliff, may be water-carried, but I shall regard it as bird-carried in Lincolnshire, till I get further proof of water-carriage, for *Rosa rugosa* has been Blackbird sown at Cadney in early sharp snow-frosts.

The Bird-Cherry (*Prunus Padus*) fruit is eaten by sheep and pigs, as also by *Turdi*. There is practically none here.

The Gean or Wild Cherry (*Prunus Avium*) is water-carried, apparently to live, for very short distances, perhaps only in its "pulp," though of this I am not yet certain. It is eaten by all stock. I have only a few bird notes:—Jackdaw, Jay, Blackbird, Song Thrush, and Hawfinch. The last always cracks the stones unless it is disturbed.

The Garden Cherry (*Prunus Cerasus*) is as the wild species. My bird list, however, is longer, for it contains all in the above list with the Golden-Oriole, Lesser Grey Shrike, Ring Ouzel, Starling, Bullfinch, Whitethroat, Lesser-Whitethroat, and Garden Warbler.

The Wild Plum (*Prunus domestica*) is sown by all domestic stock; even horses like them, and sheep run from their companions to the hedges to work and put out the stones, and in this way sow them by or in the fences. I myself in one case, carried its stone in clay on the instep of my heavy trench boot over two miles, *i.e.* down the incline to the beck just as you come out of North Kelsey village to the Vicarage door here at Cadney. I saw the plums lying in the lane, for there were no birds after the 1916-17 frost to take any hedge fruit. My bird list for it is not long. The Blackbird, Ring Ouzel, Starling, Hawfinch, Bullfinch, and Garden Warblers are all I have notes of. Yet, I believe, that this species is only truly fertile with the pollen of the next or of *P. spinosa*; at least my notes distinctly point that way, though all my own experiments through hedge cutting have been fruitless. In North Kelsey, *P. domestica* has both purple and yellow coloured fruit; the birds do not take the yellow colour form, I have been told.

The Bullace (*Prunus insititia*) has not given me a single personal note on carriage, as it is rare in Lincolnshire. I have jottings from literature of the Pheasant, Rook, Ring Dove, and Common *Turdi* eating them.

The Hybrid Plum or Large-fruited Sloe (*Prunus macrocarpa* or *fruticans*, or more likely *P. insititia* × *spinosa*, or *P. spinosain* × *sititia*, for no one has yet has unravelled its origin) is eaten and sown by the Blackbird and Mistle Thrush.

The Sloe (*Prunus spinosa*) is neolithic in Lincolnshire. The Pheasant, Rook, Ring Dove, Mistle Thrush and Blackbird eat them. They are also water-carried, but I have no proof that they ever survive. The species does well on old sandy-gravels and former coast shingles, but has not yet been migrant-bird sown on any of our modern marine shingles to my knowledge. There were very many *Turdi*-sown seedlings from the Purple Plum (*Prunus Pissardii*) after the snow-frost of 1916-17 in my sister's garden at Kirton-in-Lindsey ; and the Spanish Plum (*Prunus lusitanica*) has been bird carried to the Azores.

The Gorse (*Ulex europaeus*) is water-carried to live. Here, too, it is sown by ants on the beck-bank, as well as carried on the wet and muddy feet and boots of stock and man. Its seeds are eaten by the Pheasant and Ring Dove, and I have no doubt the *Turdi* and many other species, but only when pressed for food; but I have no bushes near at hand for study. The other two species of *Ulex*, no doubt, are the same, but personally I have had no chance of watching them.

The Broom (*Cytisus scoparius*) is also water-carried to live, and bird-sown by the same species. Yet, I have no certain proof that the Laburnum (*Cytisus Laburnum*) is eaten by birds, though I have watched it for years most carefully. It grows freely, too, on sands, gravels and chalk, but only under or near where the wind has carried seed from the parent trees, or boot-carriage is in evidence.

The two Rest-Harrows (*Ononis spinosa* and *O.repens*) are muddy and wet feet and boot carried, but after much watching I have no proof of bird carriage.

The Crowberry (*Empetrum nigrum*) is perhaps now quite extinct in Lincolnshire. Formerly it was on both the shore and Trent lines of migration. It is alimentary-canal-carried by all moorland fowl. Its seed has been

taken from the crops or gizzards of Geese, Ducks, Gulls, Skuas, Terns, Ravens, Black and Red Grouse, and the Ring-Ouzel.

The Holly (*Ilex aquifolium*) is a purely bird-sown species everywhere in the North or South of England where I have been able to watch it—the red and yellow berried forms being just the same in this respect. My list contains the Pheasant, Ring Dove, Jay, Mistle Thrush, Blackbird, Song Thrush, Fieldfares, Ring Ouzel, Redwing rarely, and Hawfinch. From hedges overhanging roads it is boot-mud carried, when winds or birds have brought the berries down. The Ring Dove and Song Thrush regurgitate the Holly seeds in masses from their gizzards, but the berries are so often taken from the bushes before they are fully ripe, that most of them fail to grow. *Ilex perado* is in the Azores.

The Spindle-tree or Skewer-wood-tree (*Euonymus europaeus*) floats from one to four weeks; it is water-carried but not to live. My bird list contains the Pheasant, Blackbird and Redbreast. The garden Bush-tree (*E. latifolius*) is visited only by the Blackbird so far as I yet know. Where is its true home? If it has one, and is not a nurseryman's production?

The Maple (*Acer campestre*) is specially wind-sown. It is water-carried too, but not to live so far as I know; and it is generally a much neglected species. After endless watching I have discovered that the Long-tailed Field Mouse feeds on its seeds, as also the Blackbird, Greenfinch, and Chaffinch in long snow-frosts. The best record for this 1919 season, was the authoritative naming of an *A. campestre* form, taken by the Rev. W. W. Mason, in June, 1915. It is the variety *lobatum*, Pax., sub-variety *molle*, Opiz., and the specimen was taken from a roadside hedge bush, far away from houses, at Dorrington, S. Lincolnshire. No doubt it was bird-sown from the continent in the spring migration; it was kindly sent by Mr. G. C. Druce, of Oxford, to Dr. A. Thellung, who finally determined it for us. The specimen is in the Druce herbarium.

The Sycamore (*Acer Pseudo-platanus*) is just the same, nearly always wind-sown, never water-carried to live,

though ever being swept along by our streams. With every chance of observing it all my life, my list of birds only contains the Domestic Fowl, Pheasant, Rook, Partridge, Blackbird, Bullfinch, Greenfinch, Chaffinch and Siskin—and these notes have only been made during or just after long snow-frosts. Yet, I have one tree on the Carr-peat here, nearly a mile from the nearest top land growth. This outlying tree for a long time puzzled me, till at last I saw the seeds from my large tree by the garden gate at Cadney Vicarage blowing into my tenant's crewyard, and later manure going out to the meadow this distant tree grows in, *still containing fertile seed*, for I tested them.

The Horse Chestnut (*Aesculus Hippocastanum*) is not a native, but as it has an unusually large seed, I have given it special study. Its seeds are eaten by the Long-Tailed Field Mouse, the Common and Bank Voles, and the Pheasant, Raven and Rook. The *Corvids* bury them in moss or rough grass or under cow-claps, and also store them in their nest for snow-frost times. I have seen the Rooks in the autumn carrying the Chestnuts from a tree-lined drive here up to their nests in the Churchyard. Its seeds are found in becks and river alluviums, but never survive water-carriage. On 1/1/1914, a rook carried a Horse-Chestnut seed from its nest in the trees in Cadney Churchyard to the horse-track on the road just by Cadney Bridge, and left it lying in the snow as I drew up returning home. The distance was a little over a mile, and the snow was so deep in the open, the horse-track was the only spot where it could have eaten it in comfort. I had the luck to see this; and as the poor bird was waiting on the top of the nearest Ash tree, I had not the heart to take the seed, but left it and turning later, saw it feasting on it alone—this latter word explains its long carriage, I believe.

The Vine (*Vitis vinifera*) seeds are now to be found in alluviums below towns and big villages, with much other human rejectamenta. The Blackbird and Robin feed on grapes even here, and both these species are emigrants in the spring from the Continent, but the autumn is the time for getting the "grape kernels" from their crops. I have

never had the luck to find them, if they are ever found, in the crops of spring migrants. We have the Fig (*Ficus Carica*) on the coast-migration line. It has been watched ever since it was a little seedling on the church where it grows. In warm climates the fig yields two crops in the year—one from the older wood, the midsummer shoots of the preceding year—this is no doubt the crop of fruit which gave us our Lincolnshire seedling—and a second in autumn, from the spring shoots of the same year.

The Alder Buckthorn (*Rhammus Frangula*) is bird-sown on all our lines of migrations, but more especially on the inland ones in contradistinction to the coast. I have had no chance of studying this species properly, but my notes on the next will indicate what birds are to be expected. In *The Naturalist*, 1893, p. 289, these two species are recorded as growing together, bird-sown, in the Trent drainage area, but in Yorkshire.

The Purging Buckthorn (*Rhammus catharticus*) I have been able to study fully, but with little result, for it is not beloved of birds, except when the hunger of long-continued rough weather perforce drives them to its berries. My list is the Pheasant, Ring Dove, Jay and Blackbird. It is always alimentary-canal-carried, and is never taken till all the other hedge-fruit has gone *R. latifolius* has been bird carried from Europe to the Azores.

The Lime (*Tilia europaea* or *vulgaris*) is a planted outsider, for it rarely ripens its seed in this climate. I have never seen a young seedling plant yet in the fifty years my work has extended over; this has not been for the want of the chance of observing. All the same I have proof that it does ripen its seeds in long dry seasons but only very occasionally, so that it is consequently a very rare thing indeed for it to be bird carried and sown. Some young trees or hedge bushes are found at Bigby, Bottesford and Howsham, where there are no trees for many hundreds of yards to over a mile or more. For instance, there is a young tree of this species in Poolthorn covert—no doubt bird-sown from the much older tree in Howsham School garden—and we know that this species was not used in planting, for we have a list of what were used:—*Journal*

of Ecology, v. VI., pp. 110—125. There is only one other supposition we can make, that it has been boot mud carried in the three parishes named, and then gale blown into the hedges; this is just a trifle too far fetched for me, who have seen Blackbirds and Chaffinches hunting amongst the leaves under the Limes presumably for its seeds, even this season in a deep snow-frost.

These are only a selection of notes on our most conspicuous trees and plants from my vast stock of jottings. I think I can say with truth, when my *Flora of Lincolnshire* is published, the chief problems of carriage for all our native species will be clearly outlined by my fifty years' love of dispersal questions. Much still remains to be done in the way of detail by younger brains and hands—no, in this case I should say legs—in this most delightful and engrossing subject, which is true Ecology.

CONCHOLOGY.

J. F. Musham, F.E.S.

My report is again brief, and in such a well-worked area as Lincolnshire this will not be unexpected, albeit further research may be rewarded by the discovery of three or four hitherto unrecorded species which are not unknown beyond the county boundaries.

The results of investigations pursued at the meeting at Ancaster credited Messrs. Peacock and Smith with some eighteen species, all previously known for that area. The Melton Ross meeting yielded similar results, with the exception of *Arion minimus*, which I now record as new for that Division. Reference may also be made to the interesting form of *Helix aspersa* var. *subscalaris*, the capture of our Secretary in the Stone Quarry there. Acquaintance also was made with the small Melton Ross colony of *Vertigo pygmaea*. An edentate example taken by Mr. Brown is pronounced by Mr. J. W. Taylor to be one of the same species. The investigations at Scotton Common yielded *Spherium corneum* only. A form of *Helix aspersa* with an extra narrow band is reported by Miss S. C. Stow as having been found in her garden at Grantham this season.

ENTOMOLOGY.

G. W. Mason.

The following notes on the season have been sent to me by the Rev. S. Proudfoot of N. Somercotes:—

"The year 1919 has been a lean one, entomologically. Lincolnshire has been no worse than other places, for reports from the localities all agree that "Sugaring" has been nearly fruitless, and larvae very scarce. This is probably owing to the excessive rains of last Autumn, the absence of hard frost in Winter, and the late and cold Spring of 1919. One exception to this was experienced at Skellingthorpe; at the end of May I found that *Carterocephalus palaemon* and *Argynnis euphrosyne* were more abundant than ever, and that *Melanippe hastata* fully maintained her place in the sun. My garden here, for the first time for seven years, failed to produce *Aplecta occulta*, *Mamestra abjecta* and *Agrotis obscura*. But I had the pleasure on July 8th of taking at sugar a delightful specimen of *Neuria reticulata*. The autumn Larvae were scarce, but *Spilosoma fuliginosa* were more abundant than usual. I am pleased to report that a young enthusiast, and promising naturalist, Carey Riggall, was fortunate enough to take a very fine specimen of *Leucania obsoleta*, from a reed at Saltfleet Haven. I have never seen a finer male of this very local species, though I have taken many at Wicken, Cambs. *Chaerocampa elpenor*, *C. porcellus*, *Miana literosa* and *Tapinostola elymi* were nearly conspicuous by their absence. A very bad year, but perhaps the precursor of much better things in 1920."

Mr. H. C. Bee of Lincoln, and other friends record many species, notably *Thecla rubi* and *C. palaemon* at Skellingthorpe on the 6th June, and *Argynnis aglaia*, *Lycaena corydon* and *Melaniargia galatea* at Ancaster.

I have only one previous record of *Leucania obsoleta* for the County.

A Marine Isopod. *Idotea linearis*, Linn., is very common, and is frequently taken with shrimps in the Humber and Wash. Arthur Smith.

VERTEBRATA.

Rev. F. L. Blathwayt, M.A., M.B.O.U.

In the 1918 Report Mr. G. H. C. Haigh's migration notes from North Cotes were given up to October 23rd. The following have been received since that date:—

Green Plovers travelling the first week in November, 1918; and a flight of Golden Plover on the 15th. During the nights of the 16th and 17th, good flights of Woodcock came in. Also, with strong east wind, a good flight of Woodcock came in on the 30th January, 1919, and continued well into February, when they were more numerous than at any time during the season. On February 9th about 400 Geese went east over Grainsby; and again on the 10th, five flocks, varying from 500 to 26 birds, also went east.

Concerning the 1919 autumn migration Mr. Haigh reports:—

September 3: Ruff, Green Sandpiper, Kingfisher, and one or two Golden Plover.

September 4: Green Plover, travelling; one Pied Flycatcher.

September 12—15: Strong north-east wind, a slight migration noticed, including Redstarts and Goldcrests.

September 18: A good many Geese.

September, end of, and early in October: Some Hen Harriers about, one seen by G.H.C.H.

October 1: Yellow-browed Warbler (the seventh Lincolnshire record).

October 3: Grey Crow.

October 4—8: Strong movement of Geese to south-east.

October 8—12: Immense rush of Green Plover, especially in the early morning of 11th and 12th, when they came in, in a continuous stream.

October 11: First Woodcock.

October 16: Young Long-tailed Duck and female Goosander shot.

It was reported to me that about twenty pairs of Lesser Terns were breeding in a certain colony on the coast.

Mr. W. S. Medlicott has sent many interesting bird notes from Normanby, North Lincolnshire, from which the following are selected:—

In the Autumn of 1918, the first Redwings were seen October 13th; the first Bramblings, October 19th; and the first Fieldfares, October 26th.

Little Owl—one, 21st November, 1918, the first recorded for that district.

Peregrine Falcon—a female, 11th March, 1919.

Woodlark—a cock, 26th March, 1919, probably a passing bird (a very rare species in the county).

Woodcock—a nest, 11th April, 1919.

Blackcock—two specimens, and one Grey-hen, Scotton Common, 12th April, 1919.

Hawfinch—sitting on nest, 14th May, 1919.

Turtle Doves—one hundred together in a field, 16th May, 1919. It is not usual to see so many together.

Rough-legged Buzzard—one shot on Santon Warren, 9th May, 1919.

Tree Sparrow—nest with three eggs, 1st June, 1919.

Lesser Redpolls—nesting 16th May, 1919.

Gosshawk—one clearly seen, which in company with Rooks circled up to a great height, 5th October, 1919.

Crossbills—four, 1st November, 1919, the first ever seen in the district by Mr. Medlicott.

The first Bramblings and Redwings were seen, 11th October, 1919; the first Fieldfares, 30th October; and the first Woodcock, 1st November.

Pycnogonum littorale, Strom. This curious marine animal akin to Mites and Spiders, is common along the coast. Arthur Smith.

GEOLOGY.

HENRY PRESTON, F.G.S.

SUB-FOSSIL SHELLS IN THE WITHAM VALLEY

Some years ago excavations were made into the east bank of the Witham, in the parish of Little Ponton, near Grantham, and these excavations revealed the existence of a great Creep of Limestone over Boulder Clay (see *Transactions of the Association of Water Engineers*, vol. xv, 1910).

Since that time I have on various occasions examined the sections of this Creep for Sub-Fossil Land Shells with considerable success. Most of the shells were found in the top layers from a foot to eighteen inches deep, but others were found as low down as 3 feet 6 inches below the surface.

The collection which was exhibited at the Annual Meeting, contains the following species:—

Bulimus obscurus
Carychium minimum
Cecilioides acicula
Clausilia bidentata
C. laminata
C. Rolphii
Cochlicopa lubrica
Cyclostoma elegans
Helix aspersa
H. hispida
H. hortensis
Helix Itala
H. lapicida
H. nemoralis
H. pulchella
H. rotundata
H. virgata
Hyalinia sp.
Pupa muscorum
Vertigo pygmaea
Vitrina pellucida

Of these Land Shells, only *Cyclostoma elegans* is actually extinct for the district, although *Cecilioides acicula*, *Clausilia bidentata*, *Helix hortensis*, *H. lapicida* and *Vertigo pygmaea* are not now found in the immediate locality.

I may mention that the best way I have found for collecting these shells is to gather the smaller material of the sub-soil when quite dry, and drop it into a pail of water. The shells then float on the surface, and may be easily gathered and sorted out.

Excavations were also made into the alluvium of the Witham Valley to a depth of nearly twenty feet. At

several depths there were rich beds of common Freshwater Shells, but at a depth of 18 feet we found a variety of *Neritina fluviatilis* of rather large size. This species has been taken alive in the Witham Valley, south of Grantham, by Mr. T. Stow, but it is very rare.

The following is a full list of the shells found in the alluvium:—

Bythinia tentaculata
Limnaea palustris
L. peregra
Neritina fluviatilis
Pisidium amnicum
P. milium
Planorbis contortus
P. spirorbis
Pupa muscorum
Sphaerium pallidum
Succinea putris
Valvata cristata
V. piscinalis

These lists of Sub-Fossil Shells may be helpful in elucidating the geology of the river-valley, as well as in showing the past conchology of the district.

LINCOLNSHIRE CRUSTACEA.

Additions to the List published in L.N.U. Transactions, vol. ii., pp. 301—2.

ARTHUR SMITH, F.L.S., F.E.S.

Homarus vulgaris Edwards.

A fine example of this well-known species was sent to the Museum by Mr. H. Donnison, 1913. It was taken near Boston.

Cancer gagurus Linn.

The edible crab is abundant, especially in the Wash area.

Portunus marmoreus Leach.

A small specimen dredged off Boston, 1912, by Mr. H. Donnison.

Pinnotheres pisum Leach.

Two specimens taken out of Mussels from Boston, 1914, by Mr. G. Allburn.

Crangon vulgaris Fabr. The Shrimp.

Palaemon serratus Fabr. The Prawn.

Shrimps and Prawns are common all along the coast.

PRESIDENTIAL ADDRESS

TO THE

LINCOLNSHIRE NATURALISTS' UNION.

By Thomas Stow, of Grantham.

I have to thank you, as a Society, as well as individually, for doing me the honour of electing me to the President's Chair of the Union. I am not a modern trained scientific man, as by profession I was a farmer, and there was no so-called scientific agriculture in my school days—there were no colleges to follow on later. All I claim to be is a self-taught lover of natural history, as every countryman should be, if he wishes to increase his zest in life. Now the self-taught man suffers from many defects, which can be easily pointed out, lack of companionship in work is perhaps the most important, but over against this he has one great advantage, he should perceive exactly the limitations of his knowledge, for he recognises the labour which it has cost him, and the means by which he has acquired it, so far as he has advanced.

I left the Grantham Grammar School in 1860, and in 1864 began to work with the microscope, starting with an old one made by Dolland of London quite a hundred years ago. It gave me a relish for the study of the minute, and I bought Feild's three-guinea microscope with extra lenses, and later Davies book on, the Preparation and Mounting of Objects. This led me on to buy an injecting syringe, and after a time I passed on to injecting frogs and toads with the help of Mr. Ball, the National Schoolmaster of Waltham-on-the-Wolds, Leicestershire. He also possessed a microscope, and worked much with it in his spare time. We soon became rather expert at injections, and sold a fair number of our preparations to professional mounters. As no money passed from them to us, we had to take out the value of our sales in microscopic goods, so we soon possessed useful collections of apparatus. Once we even sent some to an exhibition of the Royal Miscroscopic Society, through the Rev. G. Gillet, the Rector of Waltham parish. He passed them on to his brother, a member of the Society,

and the inventor of Gillet's Condenser. The then Fellows of the Society did us the honour of buying them all, and that was how we became known to the professional mounters. We also prepared other material with red and blue transparent injection, some of which I even now possess.

For this purpose we examined practically all the ponds in the neighbourhood, and in one found *Nitella translucens*, a duck-carried species, as the Rev. E. Adrian Woodruffe-Peacock says all the *Charophyta* are in this county. It showed the circulation of the sap most beautifully. Later in Denton Reservoir we discovered *Cristatella mucedo*, a most beautiful object it is, and the only species able to crawl about, but I much regret to say that there are none to be taken there now. When I went to live at the Marsh, in the parish of Barrow, Shropshire, a pond in the paddock yielded most of the *Floscularia* and other most interesting microscopic objects. In a little pond, also in the same paddock, was *Plumatella repens*. After I returned to Grantham I still worked at microscopy and this led to my finding *Volvox globata* in one pond and *Melicerta ringens* in another. Both are most interesting; the *Rotifer*, which makes its own bricks and thus builds up its own tubes, is specially so. It multiplies rapidly, and both old and young specimens may be studied at the same labour in brick-making. I also obtained from a pond in Belton park *Alcyonella stagnorum*, also another interesting Polyzoon, which I think was never named.

I have always been a field sportsman, and by good luck have had in my time much shooting; and in consequence was a lover of dogs and careful observer of their ways. At one time I specially bred pointers—a good type of dog, though not much in fashion now-a-days, or perhaps I should say, just at present. One good bitch was much given to over-excitement at the beginning of the season; to such an extent was this the case, that I had to keep her under my eyes in the house in order to feed her on eggs or anything she would eat. One morning I had been out shooting with her aid, and when I returned, she lay down on the hearth-rug before the kitchen fire for a sleep. About

an hour and a half later I left the dining room to see how she was getting on, and saw through the half-open kitchen door, the bitch rise from the rug while she was sound asleep walk across the kitchen floor, and make a dead point as if at game for fully half a minute. Then she awoke and looked as surprised as possible at finding herself at a dead point in the kitchen, as much taken aback as a man in a similar position might be. She returned to her place at once, but did not notice me standing observing her through the door. I name this, because lately there were letters in the *Daily Mail* about dogs dreaming, but nothing quite so good as this example of dreaming somnambulance. Is not the sleep-walker ever dreaming? I think so.

Can any one of us say how dogs communicate their wishes to one another? I do not mean like the rising of a covey of birds together, prompted to act in unison by the same danger, which must be equally apparent to all at once. Here is a case of what I mean. A long time ago I had a liver-coloured terrier, very faithful to his friends but not always equally nice to strangers. A postman came through the village morning and evening, and early one day Charlie —for that was the dog 's name—happened to be out and went to investigate, as dogs ever will do; but the postman thought he might bite, and so struck him with his stick; but the dog as cleverly got out of the way and so avoided the blow. Before night came Charlie had communicated this affront, for so I believe he took it, to the three shepherd dogs on the man 's route, and managed by some means to enlist them in service. The problem is how? For the same night these four dogs in the most concerted way met the postman coming into the village, and conveyed him quite through it, though they did not attempt to offer him any violence. This went on for a long time—when any of the other dogs were at home they were there. One morning the postman came to the house with letters, Charlie was in the kitchen barking furiously at him as usual from under the table. The man threw a biscuit to him, but the dog true to his nature as house guardian, was not to be bribed. So the postman stepped into the kitchen, saying as he did so, "He won 't eat it, so I may as well take it." He had,

however, to get out again pretty quickly; and Charlie took him right through the village "by himself" that day, and then returned to eat his biscuit. I could not help thinking to myself, knowing my dog as well as I did, that if the postman had been obliged to stoop to pick up anything which by chance he had dropped, while going on his rounds, he would have had a very bad time of it. This man was put on a fresh circuit soon afterwards, and it was as well it was so, for no matter how long Charlie was shut up, he knew his time and step and barked incessantly till the man had left the place behind. There are certainly in dogs what are called "personal characteristics" in mankind.

Quite another type of dog was Rover, our sheep dog, a big-limbed, quiet and gentle animal, which quickly learned, and so knew the meaning of every word spoken to him. He was very fond of going out with me shooting; and could turn a hare well, though he would not pick one up. I used often to take him with me "hedge-rowing" for them, while I left the pointer at home. I always put him through the fence so that he had the wind for it, and if there was anything lying up he was sure to find it. When he spotted a hare, he would stop dead until I was near enough, and then put it out on my side, so it generally ended in the sudden death of "poor pussy." I also used to take him with me, where he was not specially wanted, as when I went out with the pointer after partridges. He could be useful to me in many little ways. Here is an example. If a covey of partridges left my land, and settled in a field adjoining my shooting, I used to tell Rover to go through the hedge and down the cross fence side to the bottom of the field from my land in order to beat it back. This he would do as well as if I were along with him, working it across and across in the most business-like style.

In the spring of 1904 we came to live in Grantham. The late Mr. John Hawkins at once induced me to join him in gathering the shells of this district, by showing me how simple collecting is, and if anyone sticks to it, how soon useful scientific facts are gathered together. In 1896, I and my daughter—our late President—joined the L.N.U., and we have been members ever since, working more or less to-

gether at a wide range of subjects, but I specially collecting Land and Fresh-water Mollusca. At one of the L.N.U. meetings from Little Bytham to Careby Wood, my daughter found by and on a large heap of stones, a grass which had had never been taken in Britain before. It was finally named by Professor Hackel, *Festuca maritima.* It had undoubtedly arrived in that seed pasture as a stray alien, with white clover or some other European grown seed, and had just happened on the ideal conditions it required for temporary growth and seed maturing for one season, but not for permanent reproduction. For next season— a wet autumn—we were asked to visit the spot to see if we could find an English grown descendant of this foreign annual, which when first found was in masses. We quite failed to do so, as the heap of stones had been led away and the grass round it had been destroyed. This shows how in our small and quiet Union Meetings good work can be done. *F. maritima* has turned up since in England, but this was its first recorded occurrence.

Our second visit to that spot was not fruitless either. When we failed to find this grass we turned back and went up the side of the wood, and under the bark of a dead but still standing tree, I obtained three or four *Clausilia laminata.* We walked on to Carlby, a village with many stone walls, of Great Oolitic Limestone or Cornbrash, and I continued my work of looking for shells, I trust with the enthusiasm of the true naturalist, for a man standing in front of his own door, asked me if we were "looking for hidden money?" For at that time there was a rage for hiding money, and writing a book or tale to get people to discover it. "No," I said, "we are looking for shells." Money he could understand—but shells ! His interest in us died a natural death at once. Our walk and work proved fruitful enough, for we not only turned up a new locality for both *Helix lapicida* and *Balea perversa* but found that loveliest of British shells perhaps, *H. lapicida* v. *albina*, certainly one of our rarer white forms. We made for Essendine Station, after a cup of tea at the Inn, looking for shells and noting plants and their galls, as well as gathering mosses, as we went along. Our reward, amongst other things, was taking

normal *Helix hortensis*, rather large *Helix itala*, and in Essendine village, finding another spot for *Helix lapicida*. Once, later, I obtained some very nice varieties of *H. hortensis* at the top of the road leading to that village.

My reason for going so fully into detail as regards that walk is to point out a fact, which is a general experience with all-round naturalists. We set out to find whether *Festuca maritima* had survived the wet English autumn and winter. It had not done so, but if we had merely confined ourselves to plants and their galls, we should not have returned unrewarded, as Miss Stow made full lists and took specimens; but as it was we had a red-letter day amongst the more uncommon local mollusca, such as rarely comes even to the best workers.

Ropsley Rise was a pleasant walk for Mr. Hawkins and myself, and we frequently visited it. We took *Clausilia laminata* amongst the fallen leaves of Hazels and larger trees; also *Balea perversa* in a pit close by, hidden away beneath loose stones. Later we had to show it there and in walls to Mr. Peacock, who had never taken it except on Pollard Willows by alluvial streams. There it may have been flood carried, so little is known yet of the means of dispersal of land univalves.

A still rarer shell, and one of striking interest on account of the existence of possible former Beech Woods, which would alone account for its presence so far as is known yet, was *Clausilia Rolphii*, which Mr. Hawkins took on the Bridge End Road, opposite Welby Warren. It was in a little pit under a beech tree among some rotten sticks, and turning these carefully over we procured a nice gathering, which were much appreciated by the late W. Denison Roebuck. I am sorry to say there are none there now, as the war has been and gone since, causing this pit to be dug over for rabbits, and there are no rotten sticks, and so no *C. Rolphii* can be discovered. No doubt it is not far off.

Mr. Hawkins, who was nothing if not a worker, and I, continued our walks together, and as a result discovered *Helix rupestris* under the upper stones of a Lincolnshire-

Limestone wall, in Somerby village, in the wall near Harrowby Hall, and in the pinfold wall at Little Ponton. *Helix lapicida* was also with *H. rupestris* in the wall between the river and the village. On one occasion we rode with Mr. Castle to Harlaxton, and in a wall on the right hand going into the village, we took *H. pulchella* and *Pupa cylindracea*. On a wall at Careby at one of the L.N.U. meetings we found *H. rupestris* in abundance, and yet this species was not recorded for this county till August, 1902, and was even then considered scarce in Lincolnshire. What its true range is with us is not yet accurately known, as there is no doubt that, like wall-top growing plants, it is bird-foot carried from spot to spot.

I possess some young *Balea perversa* which I obtained from the parent shells when cleaning them. This shows that clearly this species, like our *Viviparae*, are *ovo-viviparous* in the language of conchologists. Why "viviparous" is not enough I cannot say.

Another shell which was held to be very rare in South Lincolnshire was *Caeciliodes acicula*, or the Blind Hairpin Shell. Mr. Peacock considers it the most widely distributed species in this county, and suggested that it only wanted carefully looking for to be found almost anywhere. I undertook to give it the study it required, and took it in quantities in a Marlston pit at Hough-on-the-Hill. The spot is well marked for future workers, as there is a windmill in the field where this pit is situated.

We all learn little handy tricks of our trade by practice, and I can tell brother shell cleaners one which will save much time and botheration in preparing shells of the size of *Balea* and smaller, not to say large ones. I take a piece of blotting paper and after dipping it in boiling water, place the shells on it I am going to prepare for my collection just as they come from the field. The heat and moisture together cause the mollusca to come out of their shells and to begin crawling about. Seizing the body of the living animals close to their shells with a pair of fine forceps, so that they cannot retire inwards, I dip them into boiling water from three to five seconds according to their size. Then a very

gentle pull is sufficient to bring their bodies wholly out, leaving the shells beautifully clean.

Another experience worth referring to is the following regarding *Anadonta cygnea*, or the Swan Mussel. In 1905, Easton fishpond on the Cringle Brook, below Skellington, was run off for the purpose of forming an osier plantation on the spot. The bed of this water when let off was found to be practically covered by these shells in all stages of growth. Many exceeded 7.75 inches in width, and the largest found by Mr. Hawkins was 8.625 across. Many visits were made by our local conchologists, and a good supply of specimens was gathered. As the area of this pond dried up, great numbers of the shells were found distributed about the adjoining fields, which had been carried away by rooks as food. Mr. Peacock tells me carrion-crows and all kind of gulls take part in this work as the shells begin to open. The workmen in the neighbourhood told us that it was quite a common thing to see the rooks carrying shells to a considerable height before dropping them in order to break the shells. This has also been observed at Cadney, Lincs., when the river Ancholme was run off in 1903 for months, and at other places, too; but in these cases it was *Anadonta anatina*, not *A. cygnea* which was carried high up into the air.

The photograph given is a characteristic one, taken by Mr. Preston, of the pond bottom from one side, after it had dried out. This gives some idea of what the quantity of shells in the pond's area really was. Some time after the spot had been ploughed and planted with osiers, one of the large lakes in Stoke-Rochford Park on the same stream, and only about a mile below, was drained and cleaned out, and a deposit of three feet of mud removed from its bottom. We visited this undertaking on several occasions, expecting to find more specimens of the Swan Mussel, but their scarcity was as marked as their abundance had been in the other case. This difference, as was pointed out by Messrs. Preston and Peacock, no doubt arose from the fact that *A. cygnea* is usually found, and grows to its very largest size, in acid or more rarely neutral peat pools on Blown-Sand

ANADONTA CYGNEA (*see page 50*).

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Commons. Nearly the whole of the water passing through the Easton pond was "top-water" drained from clay land, which would be neutral or only very slightly limy, whereas the water in Stoke-Rochford lake, receives several large springs from the Lincolnshire-Limestone, and would not be so well adapted for acid peat mollusca to multiply in. Geologically these ponds are practically the same, for they are in the Lower-Estuarine or Upper Lias-Clay The age, too, of both sheets of water, so far as we can make out, is about the same, seventy to a hundred years; so that the common circumstances of these ponds did not help to explain the fact of the upper one being crowded with very large Swan Mussels, while the lower with a strong limy water, was practically empty—only the acid or natural habitat and liking of the mollusc can do so. It is duck-carried from water to water, Mr. Peacock says.

One more little matter of observation, and that a practical one of agriculture, as befits an old naturalist-farmer, and I have finished. A friend and relation of mine had an old pasture of Very-Chalky-Boulder-Clay on the Lincolnshire-Limestone of this district, which was badly infested by the lime-loving Stemless Thistle (*Cnicus acaulis*)—a great curse on our local slimy soils in places, our pastures becoming a perfect mass of them. A single dressing of five cwt. of basic slag per acre put in in October, practically exterminated this species in that pasture. We all know that raising the manurial value, as from the dung-heap, of a clay or poorer sandy-gravel pasture, gradually drives out weed species, such as the Cowslip (*Primula veris*), or the Bugle (*Ajuga reptans*), or Green-veined Orchis (*O. morio*), but such a wholesale sweep of a pest at once I never remember to have heard of before. There were plenty of these thistles on the roadsides adjoining this pasture, and it has been suggested to me that the seed was originally carried from the roadside turf to the enclsoure on the muddy feet of sheep, or the muddy boots of men. This is a point we must leave to the botanists to decide.

I thank you, gentlemen, both for your presence and most kind attention.

SOME PLANTS found near Woodhall Spa 1917 to 1919.

Rev. Frank S. Alston, M.A.

I hope that the following list may be of interest. The plants were found growing upon a chicken farm near the Tower-on-the-Moor, and they were no doubt introduced with foreign corn. Some of them are English plants which are new to the locality, but most of them are aliens. But the aliens of to-day may become parents of well-established colonists, and it is said that all our weeds of cultivation, even such very common plants as the Dead-nettles and the Poppies, are the offspring of aliens. *Claytonia perfoliata* was only recorded in Lincolnshire for the first time in 1886, but it would now be a very difficult plant to eradicate.

Some aliens appear just for one year, and then the spot knows them no more; but many of these Woodhall plants appeared to be very well established and to be flourishing luxuriantly in 1917, and most of them were found again in 1918. In general appearance, the plants presented a brilliant display of colour, a regular garden of wild flowers of all shades. *Anchusa procera* was a splendid deep blue; Viper's Bugloss and Succory produced plenty of the lighter blue tints; the Centaureas were mostly pink and white, the Salvias purple; Melilot and *Medicago falcata* supplied an abundance of yellow; and *Alyssum incanum* a good white, so that the whole effect was very pleasing.

In the following list the numbers refer to the "List of British Plants," by G. C. Druce, M.A., F.L.S., who has very kindly named the specimens, and inserted notices of some of them in the Report of the Botanical Society and Exchange Club of the British Isles for 1917.

The letters NL signify that the plant is not in the Check-List of Lincolnshire Plants, by the Rev. E. Adrian Woodruffe-Peacock, 1909, and that it is, therefore, probably a new record for the county.

Delphinium Consolida (63), Larkspur, a native of the continent, only one plant. NL.

Glaucium corniculatum (90), a scarlet-horned Poppy, a native of pastures in the Mediterranean region, only one plant, a little gem.

Alyssum incanum (157), Madwort, abundant.

A. maritimum (158), a native of the Mediterranean region. NL.

Sisymbrium altissimum (184), Tumbling Mustard, a South European plant which has greatly extended its range in England during recent years, and also in North America.

Brassica juncea (218), Indian Mustard, a native of China. NL. S. T. Dunn (*Alien Flora of Britain*, 1905) says that it is "largely cultivated in parts of temperate and tropical Asia for the same purpose as *B. alba* is in Europe."

Lepidium densiflorum (247—4). NL.

Rapistrum perenne (266), a native of Central and Southern Europe. NL.

Reseda lutea (284), Wild Mignonette.

Lavatera triloba (443—2), a native of Spain, a large, handsome pink Mallow. New record for Britain.

Malva pusilla (454). NL.

Medicago falcata var. *tenuifoliata* (562), Yellow Medick, abundant. The variety is not in the Check-List of Lincolnshire Plants, 1909.

M. sativa (564), Lucerne.

Melilotus officinalis (593), abundant.

M. alba (595).

Coronilla varia (666), a pink Vetch, native of Central and Southern Europe. NL.

Potentilla argentea (895), Hoary Cinquefoil, occurs in the same district (10) of Lincolnshire at Salmonby, ten miles distant.

P. intermedia (896), a native of Central Europe. NL.

P. norvegica (906), a native of wet sandy places on the continent. NL.

Oenothera biennis (1061), Evening Primrose, native of North America, abundant.

Erigeron canadensis (1262), native of North America.

Inula britannica (1281), indigenous from Normandy to the Orient, an unusual alien on corn refuse. NL.

Ambrosia artemisifolia (1291), native of North America.

Helianthus debilis (1303—3). NL.

Achillea nobilis (1329), Showy Milfoil, a native of Southern Europe. NL.

Artemisia Absinthium (1367), Wormwood.

Carduus nutans var. *macrocephalus* (1422 b). This variety was first found in Britain at Bristol in 1916. NL.

Centaurea tricocephala (1451—5), a native of Eastern Europe and West Asia, from Hungary to Persia. First record for Britain.

C. Stoebe sub-sp. *Rhenata* (1457—2). First record for Britain.

C. maculosa lusus albiflora (1459—4), supposed at first to be *C. diffusa* × *Stoebe* = *C. psammaogena*, but it is not a hybrid, as the pappus is well developed; a native of Hungary and Eastern Europe. First record for Britain.

Cichorum Intybus (1480), Succory.

Lappula echinata (1787), a native of the continent of Europe, known in America as European Stick seed.

Anchusa procera (1800—3), a large plant with intense blue flowers. NL.

Echium vulgare (1825), Viper's Bugloss.

E. Italicum var. *pyramidale* (1826), first found in Britain at Cothill, Berks., in 1907. The variety is not in the Check-List of Lincolnshire Plants, 1909.

Hyoscyamus niger (1856), Henbane.

Verbascum nigrum (1867).

Mentha rotundifolia (1988,) possibly crossed with *longifolia*, as it is not our type. NL.

Salvia aethiopis (2020), a continental species. NL.

S. nemorosa (2025), a native of Southern Europe. NL.

S. verticillata (2031), a native of the Mediterranean region.

Marrubium peregrinum (2050—2), White Horehound, a native of Sicily and South Europe. First record for Britain.

Leonurus cardiaca var. *hirsutus* (2063), Motherwort. Leaves for the greater part trifid, more rugose and more softly hairy than the type. Calyxes softly hairy and less strongly spinescent. The variety is a new record for Britain, but it was also found in 1917 at Didcot and Oxford.

Amaranthus retroflexus (2110), a native of North America. NL.

Chenopodium Bonus-Henricus (2119), Good King Henry, or Mercury.

C. urbicum (2121).

C. murale (2122).

C. leptophyllum (2125), a native of North America. NL.

Setaria viridis (2689).

The place where these plants were found is a very light sandy soil reclaimed from the moor, and native plants in the neighbourhood include Gorse, Broom, Heath, Ling, *Marrubium vulgare*, *Erigeron acris*, *Geranium pusillum*, *Calamintha acinos*, *Ornithopus perpusillus*, while in the wetter places *Gentiana pneumonanthe* and *Drosera rotundifolia* may be found; and some years ago I saw growing there: *Drosera longifolia*, *Pinguicula vulgaris*, *Narthecium ossifragum*, and *Osmunda regalis*, but I believe that these are now extinct.

On the Golf Course, about half-a-mile from the chicken-farm, my attention was also directed to a very large and beautiful plant which seems to have been long established, and which proves to be *Polygonum polystachium*, a native of the Himalayas. It is a new record for Britain.

A further record for the same locality in 1918 is *Dianthus deltoides*, the Maiden Pink. This is a new record for the county, and it is undoubtedly a native. There appears to be very little of it, but the foliage is so very inconspicuous that it is very difficult to find except when it is actually in bloom.

Most of the plants named in the foregoing list were found again in 1918, with the following additions:—

Lepidium ruderale (240), Bowyer's Mustard.

Bunias Erucago (262), Prickly-podded Bunias, a native of South Europe. NL.

Medicago varia (564—2). NL.

Dipsacus fullonum var. *sativus* (1229 b), Teasel, the particular variety used by clothiers, uncommon. NL.

Grindelia squarrosa (1242), Snake-headed Grindelia, a native of North-West America. NL.

Anthemis Ruthenica (1344), Russian Chamomile, a native of Eastern Europe. NL.

Centaurea orientalis (1459—2), a native of Siberia. NL.

Sonchus asper var. *laciniatus* (1657).

Anchusa officinalis (1800), a native of Central and Southern Europe.

Verbascum lychnitis (1866).

Salvia sylvestris (2024), a native of Southern Europe. NL.

Ballota nigra var. *ruderalis* (2077 b), which seems to be always an alien in Britain. NL.

In 1919, many of the aliens were still to be found, including *Marrubium peregrinum*, which I looked for in vain in 1918. There were also the following species which I had not previously found:—

Cynosurus echinatus (2737), a grass recorded in Lincolnshire for one Division. Itis a native of the Channel Islands. Mr. R. W. Goulding informs me that he found it at Welbeck in 1918, and that in 1919 it had established itself in three separate colonies in that locality.

Two other species that turned up simultaneously at Woodhall and at Welbeck are:—

Axyris amaranthoides (2153). Mr. G. C. Druce states that it is a Siberian species which has spread over North America, and probably came from there in fodder. NL.

Amsinckia lycopsioides (1789—3)=*Benthamia lycopsioides*, a Scorpion Grass with blossoms of a brilliant orange colour, a native of California.

A HOLIDAY IN LINCOLNSHIRE.

L. A. Carr, Lichfield.

In June, 1919, I took a much needed holiday between Langworth and Wragby, and spent some part of the time searching for insects, etc., which I once knew to exist in the locality. Most of my collecting I did in Stainton Wood, where I found *Carterocephalus palaemon*, but in sadly reduced numbers. *Argynnis euphrosyne*, *Melitaea artemis*, *Vanessa urticae*, *V. io*, *V. atalanta* (one), *Gonepteryx rhamni* (one), *Euchloe cardamines*, *Nisoniades tages*, *Hesperia sylvanus*, *H. lineola*, *Macroglossa fuciformis*, *Nola cristulalis* *Euclidia mi*, *E. glyphica*, etc., etc., together with the larvae of *Nola cucullatella* (common), *Thecla betulae*, *T. quercus* (very common on every oak tree) were much as usual. *Angerona prunaria* and *Timandra amataria* were very common. However, I came across one stranger to the district when I found larvae of *Gastropacha neustria*. I know that this insect was never taken in Lincolnshire by my late father, nor have I before seen it myself.

There are two insects: *Thecla pruni* and *Hadena pabulatricola* (*connexa*) which, in my father's time, some twenty years or more ago, used to occur near Lincoln, the former at Newbold, the latter at Skellingthorpe and Market Rasen. I have not seen them in recent years, but I think it probable that *pabulatricola* would be found to occur freely if it were sought for in its season in the neighbourhood of Market Rasen.

The flora I found to be much the same as in former years. The Butterfly Orchis (*Habenaria bifolia*) was abundant and luxuriant, but the Bird's-nest (*Monotropa hypopitys*) was very scarce.

With regard to Spiders, although I have known for a number of years of species which have not as yet been recorded for the county, I did not quite realise the work that has yet to be done in this direction, and consequently I did not give them the attention they perhaps deserve, but for all that, I managed to take some few that are not included in the published list. The species that particularly attracted my attention was one that is everywhere rare, namely *Epeira alsine* W. I took both sexes, the males

were unfortunately immature, but I kept them alive on Rose Aphis and they eventually attained maturity. This species did not occur in trees as one would have expected, but quite low down in ditches. *Lycosa farrenii* Camb. turned up again at Stainton, and I also found it even in greater numbers in a new locality, Rand Wood. This is considered a rare species, and before I turned it up in this locality and in Nottinghamshire, it had only been found at Wicken Fen. That beautiful iridescent species, *Micaria pulicaria* Sund., was not uncommon running about in the sunshine; and another pretty little spider *Crustulina guttata* Wid. was not rare amongst the long grass on the sunny side of the hedgerows; where also the *Xysticidae* were well represented.

There are two species, *Epeira triguttata* Fabr., and *Ero thoracica* Wid., which are recorded for the county and which need a little attention. In 1908, *Epeira triguttata* Fabr. was found to be actually two species, namely *E. triguttata* Fabr. and *E. Sturmii* Hahn. The same thing was found to be the case with *Ero thoracica* Wid. in 1911, the species being *Ero Cambridgii* Kulcz, and *Ero furcata* Vill. Unfortunately, I did not meet with all four species, seeing only *Epeira Sturmii* Hahn and *Ero Cambridgii* K., but I have no doubt all four are in Lincolnshire, and if during the coming season collectors would submit their specimens to a specialist (or even to myself), this would probably be found to be the case.

It is most unfortunate that the colours of *Phyllonethis lineata* Clk. var. *redimitum* L.K. are so fugitive in spirit, as the range is a wide one, and there are many striking shades—one I saw was quite new to me, being violet-purple.

I came across the egg-cocoons of (according to Mr. O. Pickard-Cambridge) *Agroeca brunnea* Bl., and also *A. proxima* Camb. In the first case these are pear-shaped, pendent white silken structures, plastered over with mud, and fixed upon a stiff reed or grass stalk. The cocoons of the second species are similar in structure, only a little more spherical. I found only one example of the

developed *A. proxima* (a female), but I have no doubt the other is there also.

Besides these, I found three cocoons which I cannot place, never having seen or heard of anything quite like them. They were constructed in a similar way to those already described, but were exactly round, having their surface roughened by silk being mixed with the mud, placed altogether under a flat chip of wood, and not solitary and pendent with the mud plastered *over* the cocoon, as in the former cases. Mr. Arthur Smith has kindly intimated which of the species I took are additions to the county list, and I herewith append them. With a few days' hard work amongst dead leaves, moss, etc., in April, May, September and October, this list could easily be doubled and if the salterns near the coast received the attention they deserve, a great many species would be found which do not occur inland. At some future date, I hope to be able to give this Order more attention in Lincolnshire, as I am certain that many rare species are awaiting the collector.

List of Spiders found in or near Stainton Wood, June, 1919.

Micaria pulicaria Sund. Not rare.

Agroeca proxima Camb. One female.

A. gracilipes Bl. One female.

Tegeneria derhamii Scop. Everywhere.

Hahnia montana Bl. Occasional.

H. helveola Sim. One female.

Theridion formosum Clerck. One male and one female.

Crustulina guttata Wid. Numerous, males and females.

Lubulla thoracica Wid. Occasional.

Bathyphantes approximatus Camb. Not common.

Microphantes (*Microneta*) *saxatilis* Bl. One male.

Maso sundervallii West. Common, but widely separated.

Gongylidium gibbosum Bl. Common in one locality.

G. tuberosum Bl. Common in one locality.

Lophomma herbigradum Bl. A few.

Dicymbium tibiale Bl. One male.

Diplocephalus cristatus Bl. One male, three females.

D. fuscipes Bl. A few.

Cornicularia unicornis Bl. Two males, one female.

Caratinella brevipes Westr. Only females seen.

Ero Cambridgii Kulcz. Two females.

Epeira alsine Walck. Two males, five females.

E. Sturmii Hahn. Two females.

Lycosa farrenii Camb. Very abundant.

Neon reticulatus Bl. Occasional.

LINCOLNSHIRE NATURAL HISTORY NOTES.

from Stonehouse's "Isle of Axholme."

Rev. E. Adrian Woodruffe-Peacock, f.l.s.

In order to help future students with their topographical lists, the following notes have been extracted from *The History and Topography of the Isle of Axholme*, written by the Rev. W. B. Stonehouse, M.A., LL.D., Archdeacon of Stow, published London and Gainsborough, 1839. The references are to pages 54, 56, 65, 66, 67, 68, 69, 123 and 395. Where, from later occurrences, or from family traditions handed down from my grandfather, Edward Shaw Peacock, of Bottesford Moors, who was Archdeacon Stonehouse's greatest friend, or from the evidence of my father, Edward Peacock, of Bottesford Manor, I have confirming proof, I have added an asterisk (*) after the scientific name.

Birds.

"Moor Buzzard," or Marsh Harrier (*Circus aeruginosus**).

Met with a nest containing three young, 1836.

White-tailed Eagle (*Haliaetus albicilla**).

Kite (*Milvus ictinus**).

"Several of the falcon tribe," p. 65.

Gyr-Falcon (*Falco gyrfalco*).

Common Heron (*Ardea cinerea**).

Egret (*Ardea garzetta*).

Night-Heron (*Nycticorax criseus*).

Bittern (*Botaurus stellaris**). Two shot by him in 1817; also nest and four eggs. Notes on its flight and calls, p. 66.

Stork (*Ciconia alba**). Extinct as a breeding bird in the memory of the oldest inhabitants in 1839.

"Wild Geese," referred to twice—no details. [I have known personally "flocks" of ten thousand in the Isle of Axholme, and men who have shot the Bean-Goose (*Anser segetum**), the Pink-footed Goose (*A. brachyrhynchus**), the Grey-Lag Goose (*A. cinereus**), the White-fronted Goose (*A. albifrons**), the Brent Goose(*Bernicla brenta**).]

Wild Swan (*Cygnus musicus**). Extinct in 1839, except as casuals.

Tame Swan (*C. olor**). As the last named, but now (1920) the more common of the two as a casual.

Sheld-duck (*Tadorna cornuta**).

Mallard (*Anas boscas**). Still breeds.

Pintail (*Dafila acuta**).

Teal (*Nettion crecca**). Still breeds.

Wigeon (*Mareca penelope**). Have known it breed once.

Pochard (*Fuligula ferina**).

Scaup-Duck (*F. marila*).

Swallow-tailed Duck (*Harelda glacialis*).

(Why this duck list is so short I cannot understand. I have had proof of the following in the Trent Valley: Ruby-Duck (*Cadorna casarca*), Gadwall (*Anas strepara*), Shoveler (*Spatula clypeata*), which still breeds, as also the Garganey (*Querquedula circia*), and Tufted Duck (*Fuligula cristata*).

Partridge (*Perdix cinerea**).

Water Rail (*Rallus aquaticus**).

Water Hen (*Gallinula chloropus**).

Coot (*Fulica atra**)..

Crane (*Grus communis**). Extinct before the memory of old people in 1839 as a breeding bird.

Lapwing (*Vanellus vulgaris**).

Common Snipe (*Gallinago coelestis**). Nesting Snipe are called "Moor-Lambs" from their nuptial bleating, p. 67.

Judcock, or Jack-Snipe (*G. gallinula**).

(There is no record of Woodcock (*Scolopax rusticula**), though my grandfather, father and brother shot them; nor the Great Snipe *G. major**(, though they were shot by my grandfather and brother.)

Ruff (*Machetes pugnax**). In Ferry Flash, 12 in 1819, and 8 in 1827, all breeding birds. In 1839 "now seldom met with."

Redshank (*Totanus calidris**).

Black-tailed Godwit (*Limosa belgica*).

Common Curlew (*Numenius arquata**).

Delphinidae.

Porpoise (*Phocoena communis**).

Fish.

Bream, Dace, Eel, Pike, Roach, Salmon ("one penny per pound"), Smelt and Sturgeon. All with us still, both in the Trent and in warping-drains.

Flora.

Juncus communis, *Phragmites communis*, *Quercus pedunculata* and *Pinus sylvestris*, all incidentally named but the last, for which there is a most valuable series of notes from De la Pryme.

Mammals.

Red Deer, Fox, Hares and Rabbits, just referred to.

Out of the partly cleaned shells of *Helix aspersa*, from West Torrington, I obtained pupae of Diptera. I sent them on to Dr. A. E. Shipley, Master of Christ's College, Cambridge. He writes to me, 12/1/1920:—I sent your specimens to Mr. D. Keilin, who has sent me the following note upon them:—'The tube contains the empty puparia pupae and adults of *Aphiochaeta rufipes* Meigen (Phoridae), the complete life-history of which is described in my paper: "Recherches sur la morphologie larvaire des Diptères du genre *Phora*" in Bull. Scient. de la France et Belgique, 1911, T. XLIV, pp. 27—88. Pls. I—IV. I used to find them in the dead and decomposed snails: *Helix pomatia*, *H. aspersa*, *nemoralis*, *H. hortensis*.' I have also observed them at Cadney from decaying *Helix aspersa*, *H. nemoralis*, and I believe *H. arbustorum*. E Adrian Woodruffe-Peacock, Cadney, 19/1/20.

MARINE SHELLS OF THE LINCOLNSHIRE COAST.

ARTHUR SMITH, F.L.S., F.R.MET.S., F.E.S.,
Curator of the City & County Museum, Lincoln,
Hon. Secretary of the Lincolnshire Naturalists' Union.

The native Mollusca of the Lincolnshire coast may be said to be confined to the mud-dwelling species, and such as are associated with the salt-marshes and mud-flats. Such species may be found living, and their dead shells are deposited in great numbers at almost every tide.

At spring tides and during the winter gales, great numbers of shells are cast high up on the shore, including an appreciable number of species (often living examples) that are doubtless natives of the more rocky shores north of the county.

This list records shells of all species that are known to have been found on the Lincolnshire coast.

Mr. H. Wallis Kew published a list of the "Shells of the Lincolnshire Coast" in *The Naturalist*, 1889. Mr. B. Sturgess Dodd, Mr. J. T. Marshall, and the present writer co-operated by supplying specimens and information, and the list is a valuable record of the species that had then been discovered. Unfortunately, however, very few localities are specified, and it was, of course, impossible for the L.N.U. Natural History Divisions of the County to be indicated, as the Union was not then in existence, and the Divisional scheme was not adopted until 1895. It may be stated that Messrs. Dodd and Marshall collected chiefly in Div. 11, and the present writer in Divs. 4 and 7. The species not credited to any of these three observers were doubtless collected by Mr. Kew himself; and I am glad to state that all the entries in the list have been confirmed, with a solitary exception. That exception is *Lepton squamosum*, which Mr. Dodd in a letter to me says "must come out." A valve to which he gave this name was afterwards discovered to belong to a different species.

In the same publication, the late Mr. F. M. Burton gave a short list of shells that had been collected at Clee-

thorpes and Mablethorpe in 1857. All these have been confirmed, excepting *Solen pellucidus* and *Nucula nucleus* var. *radiata*.

Since 1889, several fresh species have been noted, chiefly by the writer, who for several years resided near the shore at Clee, and took advantage of every opportunity of examining huge masses of material thrust to high water mark during the winter gales. At such times I have found many living specimens which at other seasons of the year are scarcely ever seen; and it may be added that they were usually in fine condition, as they were wrapped in tangles of seaweed and zoophytes.

The Divisions that comprise the coastline of the county are:—

Div. 4. Immingham to Grimsby and Cleethorpes area.
Div 7. Humberstone to Mablethorpe.
Div. 11. Sutton to Skegness and Croft.
Div. 12. Wainfleet to Boston.
Div. 17. Between the Witham and Welland.
Div. 18. Welland to county boundary.

The following abbreviations are used:—

K.L. These initials denote that the species is recorded in the list published by Mr. Kew in 1889.
F.M.B. =the late F. M. Burton.
B.S.D. =B. Sturgess Dodd.
J.T.M. =J. T. Marshall.
J.o.C. =Journal of Conchology.
A.S. =the writer of this list.

The classification followed is that of the Conchological Society of Great Britain and Ireland.

It is very desirable that further information should be obtained of the occurrence of species in Divisions 12, 17 and 18; and the writer will be pleased to receive shells from those Divisions, and indeed from any other parts of the coast of the county.

AMPHINEURA.

CRASPEDOCHILUS ONYX Spengler= *Chiton cinereus* Jeffreys.

Div. 4—FMB., 1857; a few on stones near low water, AS.

PELECYPODA.

NUCULA NUCLEUS Linn.

K L; Divs. 4, 9, 11—Fairly plentiful as dead shells, living specimens occasionally, A S. Dredged off Boston by H. Donnison.

N. NUCLEUS var. **radiata** Forbes and Hanley.

Div. 9—F M B, 1857.

NUCULANA MINUTA (Muller) = *Leda minuta* Muller.

Div. 4—F M B, 1857; very rare, 1890, A S.

N. MINUTA var. **brevirostris** Jeffreys.

K L; Div. 4—A few dead shells occasionally, A S.

ANOMIA EPHIPPIUM Linn.

K L; Divs. 4, 9, 11—Living examples not common, shells frequent, A S.

A. EPHIPPIUM var. **aculeata** Muller.

Div. 4. A few specimens adhering to a mass of shells and serpulae, dredged, 1890, A S.

GLYCYMERIS GLYCYMERIS (Linn.) = *Pectunculus glycymeris* Linn.

K L (B S D); Div. 4—A fine specimen among a heap of seaweed, etc., washed up in the winter of 1892, A S.

BARBATIA LACTEA (Linn.) = *Arca lactea* Linn.

Div. 4. A few specimens, 1892, A S.

ARCA TETRAGONA Poli.

K L ("Valves not plentiful" B S D); Div. 4—Not common, A S.

MYTILUS EDULIS Linn.

K L; Divs. 4, 9, 11, 12, 17, 18—Plentiful all along the coast, A S.

M. EDULIS var. **pellucida** Pennant.

Div. 4. Not common, A S.

M. EDULIS var. **pallida** Marshall.

K L ("Dead shells, in good condition," B S D); Div. 4—Occasionally, A S.

VOLSELLA MODIOLUS (Linn.) = *Mytilus modiolus* Linn.

K L; Divs. 4, 9, 11, 12—Common, A S.

V. BARBATA (Linn.)

K L ("Not plentiful," B S D); Div. 4—A few examples, 1891, A S.

V. PHASEOLINA (Philippi).
Div. 4. A few specimens, 1890, A S.

MODIOLARIA MARMORATA (Forbes).
K L ("Two valves found," B S D).

M. COSTULATA (Risso).
Div. 11. Gibraltar Point, 17 August, 1911, A S.
Dredged off Boston by H. Donnison.

M. DISCORS (Linn.)
K L ("Young living specimens taken," B S D); Divs. 4, 9—Not common, A S.

M. DISCORS var. **semilaevis** Jeffreys.
Div. 11. Ingoldmells, B S D (J o C, 1897).

OSTREA EDULIS Linn.
K L; Divs. 4, 9, 11, 12, 17, 18—Common, A S.

PECTEN MAXIMUS (Linn.)
K L (B S D).

HINNITES PUSIO (Linn.) = *Pecten pusio* Linn.
K L ("Valves," B S D); Div. 4—Very rare, A S.

CHLAMYS VARIUS (Linn.) = *Pecten varius* Linn.
K L; Divs. 4, 9, 11—Common, A S.

CH. VARIUS var. **purpurea** Jeffreys.
Div. 4. Not common, A S.

CH. VARIUS var. **nivea** Macgillivray.
K L (Div. 11. "Near Chapel, in good condition," B S D); Div. 4—Clee, 1892, A S.

AEQUIPECTEN OPERCULARIS (Linn.) = *Pecten operc-ularis* Linn.
K L; Divs. 4, 9, 11, 12, 17, 18—Fairly frequent, A.S.

AE. OPERCULARIS var. **lineata** da Costa.
K L ("Valves," B S D).

PALLIOLUM TIGERINUS (Muller) = *Pecten tigrinus* Muller.
1857, F M B; K L ("Valves not plentiful," B S D); Divs. 4, 9—Not common, A S.

ASTARTE SULCATA (da Costa).
Div. 4. Dredged off Clee, 1892, A S.

A. SULCATA var. **trigona** Jeffreys.
Div. 4. One specimen in mass of weed, 1892, A S.

GOODALIA TRIANGULARIS (Montagu) = *Astarte triangularis* Montagu.
K L ("In drift," B S D).

CYPRINA ISLANDICA (Linn.)
K L; Divs. 4, 9, 11, 12—The valves are frequently found, and living specimens dredged, A S.

LUCINA BOREALIS (Linn.)
K L ("Young," B S D); Divs. 4, 9—Not common, A S.

THYASIRA FLEXUOSA (Montagu) = *Axinus flexuosus* Montagu.
K L (Valves, B S D); Div. 4—Dead shells, rare, 1892, A S.

MONTACUTA BIDENTATA (Montagu).
K L ("In drift," B S D); Div. 4—Very rare, 1891, A S.

TELLIMYA FERRUGINOSA (Montagu) = *Montacuta ferruginosa* Montagu.
K L ("In drift," B S D); Div. 4—1890, A S.

LEPTON CLARKIAE Clark.
Div 11. Skegness, J T M (J o C, 1897).

SYNDOSMYA PRISMATICA (Montagu) = *Scrobicularia prismatica* Montagu.
K L ("Valves," B S D); Div. 9—Among drift, 1889, A S.

S. NITIDA (Muller).
K L ("Valves," B S D); Div. 4—Rare, 1891, A S.

S. ALBA Wood.
K L ("Common, living," B S D); Divs. 4, 9, 11—A S.

S. ALBA var. **curta** Jeffreys.
K L (B S D); Div. 10—Skegness, J T M (J o C, 1897).

S. TENUIS (Montagu).
1857, F M B; K L (From the drift, scarce, B S D); Divs. 4, 9—Very rare, A S; Div. 11—Gibraltar Point, 17 August, 1911, A S.

SCROBICULARIA PLANA (da Costa)=*Scrobicularia piperata* Bellonius.

K L; Divs. 4, 9, 11—Common, living, A S. This is probably one of the oldest natives. The valves may be found in situ in the upper part of the clay-pits at Cleethorpes in a sub-fossilised state.

TELLINA CRASSA (Gmelin).

Div. 4. Dredged 1890; not common A S.

T. CRASSA var. **albida** Jeffreys.

K L; very rare with types, A S.

T. TENUIS da Costa.

K L; Divs. 4, 9—Fairly common, A S.

T. FABULA Gronovius.

K L; Divs. 4, 9, 11—Frequently found, A S.

MACOMA BALTHICA (Linn.)=*Tellina balthica* Linn.

K L; Divs, 4, 9, 11, 12, 18—Very common, A S.

M. BALTHICA var. **rosea** Clark.

K L (Div. 9. Mablethorpe, 1886, H W K).

DONAX VITTATUS (da Costa).

K L; Divs. 4, 9, 11—Not common, A S.

MACTRA STULTORUM Linn.

K L; Divs. 4, 9, 11—Common, A S.

M. STULTORUM var. **cinerea** Montagu.

K L (Common, living, B S D); Divs. 4, 9, 11—A S.

SPISULA SOLIDA (Linn.)=*Mactra solida* Linn.

K L; Divs. 4, 9, 11—Not common, living, A S.

S. SOLIDA var. **truncata** Montagu.

Div. 9. One specimen dredged 1892, A S.

S. ELLIPTICA (Brown).

Div. 9. Living specimen in drift, 1892, A S.

S. SUBTRUNCATA (da Costa).

K L ("Young, living," B S D); Div. 4—Rare, A S.

LUTRARIA ELLIPTICA Lamarck.

Div. 4. One specimen dredged off Clee, 1890, A S.

DOSINIA EXOLETA (Linn.)=*Venus exoleta* Linn.

1857, F M B; Divs. 4, 9—Living specimens dredged 1892; valves occasionally, A S.

D. LUPINA (Linn.)=*Venus lincta* Linn.

K L (In drift, B S D); Divs. 4, 9, 11—Not common, A S.

CLAUSINELLA FASCIATA (da Costa) = *Venus fasciata* da Costa.

Div. 4. Clee, 1892, very rare, A S.

TIMOCLEA OVATA (Pennant) = *Venus ovata* Pennant.

K L (B S D); Divs. 4, 9, 11—Dredged, 1892, rare, A S.

CHAMELAEA GALLINA (Linn.) = *Venus gallina* Linn.

K L (Not uncommon, B S D); Divs. 4, 9—A few, A S.

CH. GALLINA var. **triangularis** Jeffreys.
CH. GALLINA var. **gibba** Jeffreys.
CH. GALLINA var. **alba** Somerville.

Found with type, rare, A S.

CH. MERCENARIA Linn.

Div. 4. A few specimens. This exotic species has been known in the Humber for a long time (*Science Gossip*, 1889), A S.

TAPES AUREUS (Gmelin).

K L (B S D); Divs. 4, 9, 11—Not common, A S.

T. VIRGINEUS (Linn.)

K L (B S D); Div. 4, 9, 11—Fairly frequent, A S.

T. PULLASTRA Montagu.

K L ("Rather uncommon," B S D); Divs. 4, 9, 11—A S.

T. DECUSSATUS Linn.

K L ("Valves, not plentiful," B S D); Divs. 4, 9—Odd specimens found after storms, A S.

IRUS IRUS (Linn.) = *Venerupis irus* Linn.

Div. 4. One specimen in drift at Clee, 1892, A S.

PETRICOLA PHOLADIFORMIS Lamarck.

Divs. 4, 9, 11, 12. Taken at Clee, 1892. Valves common, living specimens not rare, A S.

CARDIUM EXIGUUM Gmelin.

K L ("Plentiful," B S D); Divs. 4, 9, 11, 18—A S.

C. FASCIATUM Montagu.

K L (B S D); Divs. 4, 9—Not common, A S.

C. NODOSUM Turton.

K L ("Young shells," B S D); Div. 4—1891, A S.

C EDULE Linn.

K L; Divs. 4, 9, 11, 12, 17, 18—Very plentiful, A S.

C. EDULE var. **rustica** Jeffreys.
K L ("Mablethorpe, dead shells," H W K.)

C. EDULE var. **crenulata** Lamarck.
K L ("Plentiful," B S D); Divs. 4, 9, 11—A S.

LAEVICARDIUM NORVEGICUM (Spengler) = *Cardium norvegicum* Spengler.
K L ("Valves," B S D); Divs. 4 9, 11—Frequent, living examples rare, A S.

GARI FERROENSIS (Chemnitz) = *Psammobia ferroensis* Chemnitz.
K L ("Valves occasionally," B S D); Divs. 4, 9, 11—Not common, A S.

MYA ARENARA Linn.
K L; Divs. 4, 9, 11, 12, 17, 18—Very common, A S.

M. TRUNCATA Linn.
K L; Divs. 4, 9, 11, 12, 18—Very common, A S.

SPHENIA BINGHAMI (Turton) = *Mya binghami* Turton.
K L ("Scarce," B S D).

CORBULA GIBBA (Olivi).
K L ("Young shells, not plentiful," B S D); Div. 4—A few living specimens among drift after heavy gale, 1892, A S.

CULTELLUS PELLUCIDUS (Pennant) = *Solen pellucidus* Pennant.
Div. 9. Mablethorpe, 1857, F M B.

ENSIS ENSIS (Linn.) = *Solen ensis* Linn.
K L; Divs. 4, 9, 11, 12—Not common. Dredged from Boston Deeps by H Donnison, A S.

E. SILIQUA (Linn.)
K L; Divs. 4, 9, 11, 12, 18—Common, A S.

SAXICAVA RUGOSA (Linn.)
K L; Divs. 4, 9, 11—Common, A S.

S. ARCTICA (Linn.)
K L (B S D); Divs. 4, 9, 11—Not common, A S.

PHOLAS DACTYLUS Linn.
K L (Div. 9—Mablethorpe, 1884, W. Gain); Div. 4—Clee, one specimen, 1891, A S.

BARNEA CANDIDA (Linn). = *Pholas candida* Linn.
K L; Divs. 4, 9, 11, 12, 18—Common, A S.

ZIRPHAEA CRISPATA (Linn).=*Pholas crispata* Linn.
K L; Divs. 4, 9, 11, 18,—Fairly frequent, A S. This and the species last named may be obtained living by digging during spring tides, H W K.

TEREDO NORVEGICA Spengler.
Div. 4, 11. Rarely found, A S.

SCAPHOPODA

DENTALIUM ENTALIS Linn.
K L (Dead, not plentiful, B S D); Divs. 4, 9—A few 1892, A S.

D. VULGARE da Costa=*Dentalium tarentinum* Lamarck.
Div. 4. Very rare, 1892, A S.

GASTROPODA

PATELLA VULGATA Linn.
K L; Divs. 4, 9, 11—Generally dead shells, occasionally living after storms, A S.

P. VULGATA var. **elevata** Jeffreys.
Div. 4—1889, A S.

P. VULGATA var. **intermedia** Knapp.
K L (Div. 11. "Mablethorpe, dead shell," 1886, H W K).

P. VULGATA var. **caerulea** Linn.
Div. 4—1889, A S.

P. DEPRESSA (Pennant)=*P. athletica* Pennant.
Div. 4—1889, A S.

HELCION PELLUCIDA (Linn.)
K L ("Occasionally," B S D); Divs. 4, 9, 11—After storms, A S.

H. PELLUCIDA var. **laevis** Pennant.
K L ("Occasionally," B S D).

ACMAEA VIRGINEA (Muller)=*Tectura virginea* Muller.
K L ("Occasionally," B S D); Divs. 4, 9, 11—1891, Rare, A S.

LEPETA FULVA (Muller).
Div. 11. Gibraltar Point, 17 August, 1911, A S.

FISSURELLA GRAECA (Linn.)
Div. 4—1890, very rare, A S.

GIBBULA MAGUS (Linn.)=*Trochus magus* Linn.
K L ("Occasionally," B S D); Divs. 4, 9, 11—1890, rare, A S.

G. TUMIDA (Montagu).
K L (B S D;) Divs. 4, 9, 11—1892, A S. Dredged off Boston by H. Donnison.

G. CINERARIA (Linn.)=*Trochus cinerarius* Linn.
K L (''Plentiful. Living shells taken near high-water mark at Cleethorpes,'' H W K); Divs. 4, 9, 11, 12—Common, A S.

G. UMBILICATA (Montagu).
K L (''Occasionally,'' B S D); Divs. 4 9, 11—A few, 1891, A S.

CALLIOSTOMA ZIZYPHINUS (Linn.)=*Trochus zizyphinus* Linn.
K L; Divs. 4, 9, 11—Fairly frequent, living specimens dredged, A S.

C. OCCIDENTALE (Mighels).
Div. 4. A single specimen found among drift after a heavy sea, 1892, A S.

PHASIANELLA PULLUS (Linn.)
K L (B S D); Divs. 4, 9, 11—Among small shell-drift, 1890, A S.

LACUNA CRASSIOR (Montagu).
K L; Divs. 4, 9, 11—Common, A S.

L. DIVARICATA (Fabricius).
K L (''Moderately common,'' B S D); Divs. 4, 9, 11—A S.

L. DIVARICATA var. **canalis** Montagu.
Div. 4. Rare, 1889, A S.

L. PARVA (da Costa)=*L. puteolus* Turton.
K L (Not common B S D); Divs. 4, 9, 11—Rare, A S.

LITTORINA OBTUSATA (Linn.)
K L; Divs. 4, 9, 11—Fairly frequent, A S.

L. RUDIS (Maton.)
K L; Divs. 4, 9, 11, 12, 17, 18—Common, A S.

L. RUDIS var. **sulcata** Leach.
Div. 4. A few, 1891, A S.

L. RUDIS var. **jugosa** Montagu.
Div. 11. Gibraltar Point, 17 August, 1911, A S.

L. RUDIS var. **tenebrosa** Montagu.
K L (Div. 9. Saltfleet Haven, 1886, H W K).

L. RUDIS var. **similis** Jeffreys.
K L (Div. 9. With the last named).

L. LITTOREA (Linn.)
K L; Divs. 4 9, 11, 12, 17, 18—Common, A S.

L. LITTOREA var. **paupercula** Jeffreys.
K L (Div. 9. Tetney, 1886, H W K).

RISSOA PARVA (da Costa).
K L ("Common," B S D); Divs. 4, 9, 11—Frequent, A S.

R. PARVA var. **interrupta** Adams.
K L ("Common," B S D); Divs. 4, 9, 11—A S.

R. INCONSPICUA Alder.
K L (Common, B S D).

MANZONIA COSTATA (J. Adams) = *Rissoa costata* J. Adams.
K L ("Moderately common," B S D); Divs. 4, 9, 11—1890, A S.

ZIPPORA MEMBRANACEA (J. Adams) = *Rissoa membranacea* J. Adams.
K L (B S D); Div. 11. Gibraltar Point, 17 August, 1911, A S.

ONOBA STRIATA (J. Adams) = *Rissoa striata* J. Adams.
K L ("Common," B S D); Divs. 4, 9, 11—A few, 1890, A S.

O. STRIATA var. **aculeus** Gould = var. **arctica** Loven.
K L ("Occasionally," B S D).

CERATIA PROXIMA (Alder) = *Rissoa proxima* Alder.
K L (Div. 11. "In Skegness drift," B S D.)

CINGULA TRIFASCIATA (J. Adams) = *Rissoa cingillus* Montagu.
K L ("Moderately common," B S D); Divs. 4, 9, 11—Frequent, A S.

BARLEEIA RUBRA (Montagu).
Div. 11. Gibraltar Point, 17 August, 1911, A S.

ASSIMINEA GRAYANA Leach.
1857, F M B; Div. 4—A few, 1890, A S; Div. 11—Gibraltar Point, 17 August, 1911, A S.

PALUDESTRINA STAGNALIS (Baster) = *Hydrobia ulvae* Pennant.
K L; Divs. 4, 9, 11, 12, 17, 18—Very common, A S.

P. STAGNALIS var. **albida** Jeffreys.
K L (Div. 11. Fairly abundant at Sutton and Skegness, B S D and J T M).

P. STAGNALIS var. **barleei** Jeffreys.
K L (Div. 11. Skegness, J T M).

P. CONFUSA (Frauenfeld) = *Hydrobia similis* Draparnaud.
Div. 9. Saltfleetby, 1904, C. S. Carter. In drain, Humberstone, 1906, A S.

P. VENTROSA (Montagu) = *Hydrobia ventrosa* Montagu.
K L (Div. 3—New Holland and South Ferriby, H W K; Div. 9—Somercotes, H W K); Div. 9—Humberstone, A S.

SKENEA PLANORBIS (Fabricius).
Div. 4. Clee, 1889, A S.

CAPULUS HUNGARICUS (Linn.)
K L; Div. 4. Clee, 1888, B. Wall; Clee, 1891, A S.

CALYPTRAEA CHINENSIS (Linn.)
Div. 4. One small specimen, Clee, 1891, A S.

CREPIDULA FORNICATA (Linn.)
Mentioned by H. W. Kew (*Naturalist*, 1889, p. 358). Div. 4—First noticed in 1887 and 1888, when it occurred in numbers, having been introduced with American Oysters and deposited in the Oyster-beds, A S.

TRIVIA EUROPAEA (Montagu) = *Cypraea europaea* Montagu.
K L; Divs. 4, 9, 11—Frequent, especially in Div. 4, A S.

NATICA CATENA (da Costa).
K L; Divs. 4, 9, 11, 18—Fairly common, A S.

N. MONTAGUI (Forbes) = *N. montacuti* Forbes.
K L ("Not plentiful," B S D).

VELUTINA LAEVIGATA (Pennant.)
K L; Divs. 4, 9—Not common, A S.

BITTIUM RETICULATUM (da Costa) = *Cerithium reticulatum* da Costa.
K L ("Common," B S D); Divs. 4. 9, 11—Fairly frequent, A S.

SCALA TURTONIS (Turton) = *Scalaria turtonis* Turton.
Div. 4. Clee, 1892, A S.

S. CLATHRUS (Linn.) = *Scalaria communis* Linn.
Div. 4—1892, A S.

CIONISCUS ALBIDUS (G. Adams)=*Aclis unicus* Montagu.

K L (Div. 11. "In Skegness and Sutton Drift, sometimes living, rather scarce," B S D and J T M).

ACLIS ASCARIS (Turton.)

K L (Div. 11. Sutton, J T M).

A. MINOR (Brown)=*A. supranitida* S. V. Wood.

K L (Div. 11. "In drift, Skegness," B S D).

ODOSTOMIA PLICATA (Montagu).

K L (B S D).

BRACHYSTOMIA ALBELLA (Loven)=*Odostomia albella* Loven.

K L ("Occasionally," B S D).

B. RISSOIDES (Hanley).

K L ("Common," B S D).

B. RISSOIDES var. **nitida** Alder.

Div. 11. Skegness, J T M (J o C, 1899).

B. RISSOIDES var. **exilis** Jeffreys.

Div. 11. Skegness, J T M (J o C, 1899).

B. AMBIGUA (Maton and Rackett)=*Odostomia pallida* Montagu.

K L (B S D).

B. AMBIGUA var. **crassa** Thompson.

Div. 11. Skegness, J T M (J o C, 1899).

ODA DOLIOLIFORMIS (Jeffreys)=*Odostomia dolioliformis* Jeffreys.

K L (Div. 11. "Skegness, rather scarce," B S D and J T M).

PYRGULINA INDISTINCTA (Montagu)=*Odostomia indistincta* Montagu.

K L ("Rather scarce," B S D).

P. INTERSTINCTA (Montagu).

K L ("Somewhat scarce," B S D).

SPIRALINELLA SPIRALIS (Montagu)=*Odostomia spiralis* Montagu.

K L ("Common," B S D).

TURBONILLA LACTEA (Linn.)=*Odostomia lactea* Linn.

K L ("Not common," B S D).

EULIMELLA NITIDISSIMA (Montagu)=*Odostomia nitidissima* Montagu.

Div. 4. Clee, very rare, 1891, A S.

CAECUM IMPERFORATUM (G. Adams) = *Caecum trachea* Montagu.
Div. 11. Skegness, J T M (J o C, 1899).

TURRITELLA COMMUNIS (Lamarck = *Turritella terebra* Linn.
Div. 4. Cleethorpes, 1891, rare, A S.

APORRHAIS PES-PELICANI (Linn.)
Div. 4. Cleethorpes, 1890, A S.

BUCCINUM UNDATUM Linn.
K L ; Divs. 4, 9, 11, 12, 17, 18—Common, A S.

B. UNDATUM, m. Sinistrorsum.
Occasionally found with the type, A S.

NEPTUNEA DESPECTA (Linn.)
Divs. 4, 9. A specimen was found at Cleethorpes, 1898, and another at Humberstone, 1901, A S.

N. ANTIQUA (Linn.) = *Fusus antiqua* Linn.
K L; Divs. 4, 9, 11, 12, 18—Very Common, A S.

VOLUPTOPSIS NORVEGICUS (Chemnitz) = *Fusus norvegicus* Chemnitz.
Div. 9. One dredged off Tetney, 1902; others at rare intervals, A S.

TRITONOFUSUS GRACILIS (da Costa) = *Fusus gracilis* da Costa.
K L (B S D); Divs. 4, 9, 11—Not uncommon, A S.

OCINEBRA ERINACEA (Linn.) = *Murex erinacea* Linn.
K L ("Rather common," B S D); Divs. 4, 9, 11, 12, 18—Worn shells plentiful, living examples after storms, A S.

TROPHON MURICATUS (Montagu).
K L (B S D); Divs. 4, 9, 10—Fairly frequent, A S.

TROPHON CLATHRATUS var. **truncata** Strom. = *T. truncatus* (Strom.)
K L; Divs. 4, 9, 11—Fairly frequent, A S.

PURPURA LAPILLUS (Linn.)
K L; Divs. 4, 9, 11, 12—Common, A S.

P. LAPILLUS var. **major** Jeffreys.
K L ("Occasionally," B S D); Divs. 4, 9, 11—A S.

NASSA RETICULATA (Linn.)
K L; Divs. 4, 9, 11, 18—Fairly common, A S.

N. INCRASSATA (Strom.)
K L; Divs. 4, 9, 11—Not uncommon, A S.

BELA TURRICULA (Montagu) = *Pleurotoma turricula* Montagu.
K L; Divs. 4, 9, 11—Not common, A S.

B. TREVELYANA (Turton).
K L ("Scarce," B S D).

B. RUFA (Montagu).
K L; Div 4—A few, 1892, A S.

MANGILIA STRIOLATA (Scacchi) = *Pleurotoma striolata* Philippi.
Div. 4. Very rare, 1892-3, A S.

M. COSTATA (Donovan).
K L ("Occasionally," B S D); Divs. 4, 9, 11—A S.

M. NEBULA (Montagu).
K L ("Occasionally," B S D); Divs. 4, 9—Rare, A S.

M. NEBULA var. **laevigata** Philippi.
Div. 11. Gibraltar Point, 17 August, 1911, A S.

BELLARDIELLA GRACILIS (Montagu) = *Defrancia gracilis* Montagu.
Div. 4. One specimen, 1890, A S.

TORNATINA OBTUSA (Montagu) = *Utriculus obtusus* Montagu.
K L; Divs. 4, 9, 11—Frequently found in drift, A S. Common, muddy estuaries as, amongst others, those of the Humber and Wash (*British Conchology*, iv. 424).

T. OBTUSA var. **lajonkaireana** Basterot.
K L (B S D).

DIAPHANA HYALINA (Turton) = *Utriculus hyalinus* Turton.
K L (Div. 11. "Sutton and Skegness, fine, rather scarce," B S D and J T M).

BULLINELLA CYCLINDRACEA (Pennant) = *Cylichna cylindracea* Pennant.

K L ("Occasionally," B S D); Div. 4—Rare, A S.

ACERA BULLATA Muller.

K L ("One or two," B S D).

PHILINE CATENA (Montagu).

K L ("Scarce," B S D).

P. ANGULATA Jeffreys.

K L (Div. 11. Skegness, rare, B S D and J T M).

P. APERTA (Linn.)

K L ("Two or three specimens, B S D); Div. 4—Very rare, 1891-2, A S.

ALEXIA DENTICULATA var. **myosotis** Draparnaud = *Melampus myosotis* (Drap.)

K L (Near Saltfleet Haven, H W K); Divs. 4, 9, 11—Great Cotes, 1893, Humberstone, 1891, A S.

CEPHALOPODA.

SEPIA OFFICINALIS Linn.

K L ("Dorsal Plate," B S D); Div. 9—Dredged off Humberstone, 1902, A S.

SEPIOLA SCANDICA Steenstrup = *S. rondeleti* Leach.

K L ("Living," B S D).

S. ATLANTICA d'Orbigny.

Div. 11. Skegness, living, August, 1919, F. Hind.

POLYPUS VULGARIS (Lamarck) = *Octopus vulgaris* Lamarck.

Div. 4. Dredged off Clee, July, 1901, A S.

MOSCHITES CIRROSA (Lamarck) = *Eledone cirrosa* Lamarck.

Div. 9. Dredged off Donna Nook, June, 1899, A S.

CHECK LIST OF NON-MARINE MOLLUSCA

Compiled from the Register and Manuscripts of the late
William Denison Roebuck, m.sc., f.l.s., m.c.s.,

By John Frederick Musham, f.e.s., m.c.s.,
President of the Mollusca Section of the L.N.U.

FOREWORD.

This Check List, which records the species that have been found in Lincolnshire, the second largest County in England, with its many sub-divisions for scientific purposes, and which records the more notable varieties, must of necessity be brief, unless it is to become a book, rather than a reference table, which I believe is generally desired.

I have attempted to show topographically all the information that has been collected up to date by the Lincolnshire Naturalists' Union in working out the distribution of our local Mollusca.

The ecology of the species will come later, I trust from the hands of various specialists in the County.

The artificial divisions of Lincolnshire that were accepted by the Union in 1895, and have been used ever since, have been strictly followed.

This too is arranged on similar lines to the Rev. E. Adrian Woodruffe-Peacock's Check List of Lincolnshire Plants, the same signs being used.

Natural History divisions 1 to 12 are in 54 N. Lincs; 13 to 18 are in 53 S. Lincs. These divisions are also further split as shown in the 1895 Map (*The Naturalist*, 1895, pp. 289—301) into N. or S.E. or W. as the case may be.

The sign *plus* (+) before division numbers signifies that the species has been recorded for that area. The other form *plus all* (+ all) that the Mollusc has been found in every division of the County. The sign *minus* (—) implies that the species has been recorded for all the divisions except those indicated; or not at all. The word *all* with a division number denotes that the species has been recorded for all the sub-divisions of that division.

In the sequence of species I have partly followed the list of **BRITISH NON-MARINE MOLLUSCA**, published by the Conchological Society of Great Britain and Ireland and partly Roebuck's Table of *Records*, which is in my possession.

The more frequent varietal forms of *Helix nemoralis* and *Helix hortensis*, etc., I have ventured to omit from this table on account of their general distribution.

According to their priority, as shown in the Roebuck MSS., I have endeavoured to give each student credit for the work he or she may have done in making first records. In order to cut down the printing as much as possible, I have only added them for species recorded for less than six divisions, as well as for the rarer varieties.

Interest in Lincolnshire Mollusca dates back to the renaissance of learning in the latter half of the XVII. century, when it found an able and immortal exponent in Dr. Martin Lister, of Craven in Yorkshire, and of Burwell in Lincolnshire.

The following species will be for ever associated with the date 1678, and with his memory:—*Limax maximus*, *Arion ater*, *Agriolimax agrestis*, *Helix aspersa*, *Helix nemoralis*, *Helix arbustorum*, *Helicigona lapicida*, *Helicella itala*, *Hyalinia fulva*, *Pupa cylindracea*, *Clausilia bidentata*, *Cyclostoma elegans*, *Zua lubrica*, *Limnea stagnalis*, *Limnea peregra* v. *ovata*, *Succinea putris*, *Bythinia tentaculata*, *Physa fontinalis*, *Planorbis corneus*, *Planorbis umbilicatus*, *Vivipara contecta* (*Paludina listeri*).

The next students in point of time, of whom we have notes, were the late John Hawkins, of Grantham, and the late F. M. Burton, of Gainsborough.

The Northern portion of the county has produced all the list-printers.

The earliest of these lists was published in Young England, vol. 3, 1864, p. 128; and Mr. Roebuck called it "*The Pioneer List of Lincolnshire Land and Fresh-water Shells.*" It enumerates 68 species, all but five taken within a radius of $1\frac{1}{2}$ miles of Brigg, by the late Thomas Ball, of that place.

Next came Roebuck's own List, *Naturalist*, 1887, pp. 245—272; Mr. H. Wallis Kew's List, *Naturalist*, 1902, pp. 261—270; Mr. C. S. Carter's list, *L.N.U. Transactions*, vol. 1, pp. 22—52; and finally Roebuck's Census List, *L.N.U. Transactions*, vol. 1, pp. 206—311.

The information in this Check-List is brought up to the date of its Foreword, and I venture to claim that it is a true and reliable summary of all the Roebuck MSS., which have reached my hands through the L.N.U. The entries in these MSS. have been checked with the various publications of all the keen workers on this subject in the Union's *Transactions* and elsewhere, so far as Messrs. Roebuck, Peacock or I have heard of them.

My indebtedness to the father of the present-day Lincolnshire Naturalists, the Rev. E. Adrian Woodruffe-Peacock, for the many valuable hints which he has so readily given me during the compilation of this List, is a liability not lightly discharged, excepting by fresh effort at discovery in the field.

J. F. MUSHAM,

48 Brook Street, 12/12/1919.
Selby, Yorks.

SUMMARY of Species recorded for
NORTH LINCOLNSHIRE: Divisions 1 to 12.

10S	West-Fen	37	11S	Burgh	56
12	Boston and East Fen	37	7N	Market Rasen	61
3NE	Barton-on-Humber	40	4	Great Grimsby	63
8N	Ludborough	45	7S	Wragby	62
6W	Saxilby	47	6E	Lincoln, North	75
1	Isle of Axholme	49	9	Saltfleet	76
5W	Gainsborough	50	2S	Broughton	77
10N	Horncastle	52	11N	Alford	79
2N	Winterton	55	3SW	Caistor and Brigg	86
5E	Kirton Lindsey	54	8S	Louth	86

SUMMARY of Species recorded for
SOUTH LINCOLNSHIRE: Divisions 13 to 18.

18E	Long Sutton	19	14E	Heckington	46
18M	Holbeach	24	16SW	Stamford	48
14W	Sleaford	31	16N	Bourne	53
17N	Swineshead	31	15S	Corby	69
18W	Spalding	31	13E	Nocton	70
17S	Donington	34	15N	Grantham	82
16SE	Crowland	37	13W	Lincoln, South	91

Lincs.—North: 119 species Lincs.—South: 109 species.

For county as a whole: 125 species.

INITIALS used in the Text.

A S: Mr. A. Smith
C S C: Mr. C. S. Carter
C T M: Mr. C. T. Musson
D M: Mr. D. Metcalfe
E A W P: Rev. E. Adrian Woodruffe-Peacock
F W F: Mr. F. W. Fierke
F R: Mr. F. Rhodes
F M B: Mr. F. M. Burton
G W M: Mr. Guy W. Mason
H W K: Mr. H. Wallis Kew
H E Q: Mr. H. E. Quilter
H P: Mr. H. Preston
J F M: Mr. J. F. Musham
J E M: Mr. J. Eardley Mason (the late)
J B D: Mr. J. Burtt Davy
J E W L: Rev. J. E. Wallis Loft (the late)
J H: Mr. J. Hawkins (the late)
J H S: Mr. J. Hardy (senr.)
J A H: Mr. J. A. Hargreaves
Jeff B C: Jeffrey's British Conchology.
L N U: Lincs. Nats. Union Field Meeting.
L C C: Leeds Conchological Club.
R W: Mr. R. Worsdale
S A: Miss Susan Allott
S C S: Miss S. C. Stow
T B: Mr. Theodore Burtt
T S: Mr. T. Stow.
W D R: Mr. W. Denison Roebuck (the late)
W W M: Rev. W. W. Mason

GASTROPODA.

TESTACELLA HALIOTIDES Drap. + 5 W (F M B; E A W P); 6 E (A S).

TESTACELLA SCUTULUM Sow. + 3 SW (S A); 15 N (H E Q); 16 SW (D M).

LIMAX MAXIMUS Linn. — 8 N; 9; 10 S; 11 S; 12; 13 E; 18 E.

v. **aldrovandi** Moq. Tand. + 8 S (C S C); 6 E (Arnold and Smith).

v. **bicolor** Taylor. + 8 S (C S C).

v. **cellaria** D'Argenville. + 3 SW; 4; 5 E; 6 E; 8 S; 11 N; 15 N.

v. **candida** Liss & Pol. + 2 S (E A W P).

v. **concolor** Moll. + 8 S (H W K); 13 W; 18 W (J F M).

v. **ferussaci** Moq. Tand. + 8 S (C S C); 13 W (J F M); 14 W (W D R); 15 N (T B).

v. **fasciata** Moq. Tand. + 3 NE; 3 SW; 5 E; 6 E; 7 all; 8 S; 11 N; 13 W; 15 S; 16 N; 18 W.

s.v. **mulleri** Moq. Tand. + 6 E (A S & J F M); 13 W (J F M); 16 N (T S).

v. **nigra** Dum. & Mort. + 3 SW (E A W P)

v. **obscura** Moq. Tand. + 11 N (J F M).

v. **sylvatica** Morelet. + 2 S; 3 NE; 6 E; 11 N; 13 W; 17 N.

LIMAX CINEREO-NIGER Wolf. + 3 SW (E A W P); 16 SW (W D R).

s.v. **luctuosa.** + 16 SW (E A W P).

LIMAX FLAVUS Linn. + 1; 2 S; 3 SW; 4; 6 E; 8 S; 11 N; 13 E; 13 W; 15 N; 16 SE; 18 M.

v. **umbrosa** (Philippi). + 6 E (A S).

s.v. **columbrina.** + 3 SW (J E W L).

LIMAX ARBORUM B.C. + 1; 2 all; 3 all; 4; 6 E; 7 all; 8 S; 11 all; 16 SW.

v. **bettonii** Sordelli. + 8 S (H W K).

s.v. **nemorosa** Baudon. + 11 N (W D R & J F M).

LIMAX TENELLUS Mull. —all.

AGRIOLIMAX AGRESTIS Linn. — 10 S; 18 E.

v. **albitentaculata** D. & M. + 11 N (J E M).

s.v. **albida** Moll. + 6 W (W D R); 8 N (W D R); 8 S (C S C; 11 N (J E M); 13 W (J F M).

v. **brunnea** (Taylor). + 3 NE (G W M).

v. **nigra** Morelet. + 3 NE (G W M).

pallida Schrenk. + 6 W (J F M &W D R) 7 N (Smith and Arnold); 16 N (W D R).

v. **rufescens** D. & M. + 3 SW (E A W P); 13 W (J F M).

v. **reticulata** Mul. + 4; 6 E; 8 S; 11 all; 13 all; 15 S; 17 N.

s.v. **sylvatica** Moq. Tand. + 2 N (E A W P); 11 N (J E M); 15 N (W D R); 13 W (J B D).

v **tristis** Moq. Tand. = **brunnea** + 11 N (W D R).

AGRIOLIMAX LAEVIS Mull. — 3 all; 5 E; 10 S; 13 E; 14 E; 15 all; 16 all; 17 N; 18 W; 18 E.

MILAX SOWERBYI (Fer.) + 3 NE; 6 E; 7 N; 8 S; 13 W; 15 N; 16 SE; 17 N; 18 E.

MILAX GAGATES (Drap.) + 6 E; 11 N; 13 W; 15 S; 16 N; 17 N; 18 E.

v. **plumbea** Moq. Tand. + 11 N; (J E M).

v. **rava** Williams. + 6 E (A S); 16 N (Peacock & Roebuck); 8 S (H W K); 10 N (E A W P).

ARION ATER Linn. + all.

v. **aterrima** (Taylor). + 16 N (H P).

v. **brunnea** (Rbk.) + 7 N (J F M & E A W P); 13 W (J F M).

v. **brunneo-nigrescens** (R.) + 18 M (W D R).

s.v. **brunneo-pallescens** (Roebuck). + 8 S (W D R & H W K); 16 S W (H P).

v **bicolor** (Roebuck). + 8 S (H W K).

v. **castanea** D. & M. + 3 SW; 7 N; 8 S; 10 N; 11 N; 16 N; 16 SW.

s.v. **luteo-pallescens** Cock. + 11 N (J E M); 15 S (C S C).

s.v. **nigrescens** Moq. Tand. + 3 SW (E A W P); 8 S (H W K); 15 S (S C S).

v. **plumbea** (Roebuck). + 8 N (C S C).

v. **rufa** Linn. + 8 S (H W K); 11 N (S A).

v. **succinea** Mull. + 15 N (J H); 8 S (W D R & H W K).

v. **swammerdamii** = **marginella** (Schr.) + 3 SW (E A W P).

ARION SUBFUSCUS (Drap.) + 7 all; 8 S; 10 S; 11 all; 13 W; 15 N; 16 N; 16 SW.

v. **cinereo-fusca** Drap. + 11 S (J B D).

v. **rufo-fusca** Drap. = type. + 11 N (W D R & J E M).

ARION HORTENSIS Fer. — 9; 10 S; 13 E; 16 N; 18 E.

v. **subfusca** Pfeiffer. + 2 S (E A W P); 11 N (J E M); 11 S (J B D); 3 SW (F W F).

ARION CIRCUMSCRIPTUS Johnson = **fasciatus** Nilsson. — 1; 5 E; 9; 13 E; 14 E; 16 SW; 17 S.

v. **neustriaca** Mabile. + 3 NE (W D R); 4 (Carter & Roebuck) 6 E (A S); 7 N (E A W P); 18 M (W D R).

ARION INTERMEDIUS Norm. = **minimus** Sim. —12; 14 E; 16 SW; 16 SE.

v. **alba** Taylor. + 8 S (C S C).

Arion intermedius Norm.—*cont.*

v. **normalis** Moq. Tand. + 8 S (C S C).

v. **plumbea** Coll. = **grisea** Rbk. + 7 N (E A W P).

GEOMALACUS MACULOSUS Allman. — all.

VITRINA PELLUCIDA Mull. — 1; 5 W; 6 W; 10 S; 14 W; 16 SW; 16 SE; 17 S; 18 W; 18 M.

HYALINIA LUCIDA (Drap.) + 2 (E A W P); 11 S (C S C).

HYALINIA CELLARIA Muller. — 17 S; 18 M.

v. **albina** Moq. Tand. + 3 SW (E A W P); 8 N (W D R); 15 N (C S C).

v. **compacta** Jeff. + 13 W (J F M).

v. **complanata** Jeff. + 2 N (C S C & E A W P); 15 S (R W).

v. **scharffi**. + 2 N (Musham & Roebuck)

sub-fossil + 6 E (Smith & Musham).

HYALINIA HELVETICA (Blum.) — 1; 2 all; 3 all; 5 all; 6 W; 9; 10 S; 12; 14 all; 16 SE; 17 all; 18 all.

HYALINIA ALLIARA Muller. — 6 W; 10 S; 16 SE; 17 S; 18 W; 18 M.

v. **viridula** Jeff. + 8 N (W D R).

HYALINIA NITIDULA (Drap.) — 10 S; 16 SE; 17 all; 18 M; 18 E.

v. **nitens** (Mich.) + 13 W (J F M); 15 N (W D R).

sub-fossil. + 6 E (Smith & Musham).

HYALINIA PURA (Alder). + 2 all; 3 SW; 6 W; 7 all; 8 all; 9; 11 all; 13 W; 15 S; 16 SW.

v. **nitidosa** Fer. + 8 S (W D R); 13 W (J F W); 16 S W (W D R).

v. **margaritacea** Jeff. + 7 N (W D R); 7 S (J F M); 8 S (Kew & Roebuck); 11 (W D R).

HYALINIA RADIATULA (Alder). + 2 all; 3 SW; 8 S; 11 all; 13 all; 14 E; 15 all; 16 N.

v. **virid-alba** Jeff. + 13 W (J F M).

HYALINIA CRYSTALLINA (Mull.) — 1; 2 S; 6 W; 7 S; 10 all; 12; 16 SW; 16 SE; 17 all; 18 all.

v. **complanata** Jeff. + 8 S (H W K).

v. **contracta** Westl. + 5 E (W D R); 11 N (W D R); 13 E (J F M); 13 W (A S).

sub-fossil. + 6 E (Smith & Musham).

HYALINIA (EUCONULUS) FULVUS (Mull.) + 2 all; 3 all; 4; 5 W; 7 all; 8 S; 9; 10 S; 11 all; 13 all; 15 N; 16 N.

v. **viridula** Taylor. + 8 S (C S C).

ZONITOIDES NITIDUS (Mull.) + 1; 3 SW; 6 W; 7 S; 8 S; 10 S; 13 all; 15 all; 16 SE; 17 S.

ZONITOIDES EXCAVATUS (Bean). + 10 N (F W F); 10 S (Musham & Roebuck).

PUNCTUM PYGEUM (Drap.) + 2 S; 3 all; 5 E; 6 E; 7 N; 8 all; 9; 11 all; 13 all; 15 S.

PYRAMIDULA RUPESTRIS (Drap.) + 5 E (W D R); 15 all; 16 S W (Roebuck & Musham).

PYRAMIDULA ROTUNDATA (Mull.) — 12; 14 all; 16 S E; 17 S; 18 all.

v. **alba** Moq. Tand. + 2 S (F W F & E A W P); 8 S (C S C).

v. **alba-cincta**. + 2 S (E A W P).

v. **pyramidalis** Jeff. + 6 E (W D R); 10 N (C S C).

v. **rufula** Moq. Tand. + 6 E (Smith & Musham).

v. **scalaris**. + 8 S (C S C).

v. **turtonii** Flem. + 7 N (C S C & E A W P); 8 S (C S C); 13 W (J F M).

sub-fossil. + 6 E (Smith & Musham)

ACANTHINULA ACULEATA Mull. + 1; 2 all; 3 SW; 5 W; 8 S; 11 all; 13 all; 15 all.

sub-fossil. + 6 E (Smith & Musham).

ACANTHINULA LAMILLATA (Jeff.) — all.

HELIX ASPERSA Mull. — 10 S; 16 SE.
v. **albo-fascaita** Jeff. + 3 SW; 5 E; 11 N; 13 W.
v. **conoidea** Pic. + 4 (A S); 9 (C S C).
m. **cornucopia** Gme. + 2 S (E A W P).
v. **exalbida** Moq. Tand. + 2 S; 5 E; 8 S; 9.
v. **flammea** Pic. + 2 S; 4; 5 E; 6 E; 8 N; 9; 17 S; 18 E.
v. **glabra** (Calc.) + 7 S; 13 W (J F M).
v. **globosa** Pic. + 11 N (C S C); 13 W (J F M).
s.v. **grisea** Moq. Tand. + 4; 11 N (J F M).
holocene. + 11 S (J. W. Taylor: Monog.).
v. **lutescens** Gr. + 11 N (J F M).
v. **minor** Pic. + 8 N; 8 S; 9; 13 W.
v. **nigrescens** Moq. Tand. + 3 SW (E A W P); 8 S (C S C); 13 W; (J F M).
v. **obscurata** Moq. Tand. + 9 (J F M).
v. **tenuior** (Shuttl.) + 7 S (J F M).
v. **undalata** Moq. Tand. + 4 S; 3 SW; 6 E; 8 S; 9; 16 N; 13 W; 15 S.
v. **unicolor** Moq. Tand. + 2 S (E A W P).
v. **zonata** Moq. Tand. + 2 N; 4 S; 5 E; 7 S; 9; 14 W.
v. near **subscalaris Fer.** + 3 SW (A S).

HELIX POMATIA Linn. + 6 E (in Roman remains, Miss Moore).

HELIX NEMORALIS Linn. — 10 S.
The more frequent varietal forms occur generally; also
v. **albina** Moq. Tand. + 8 N (C S C); 7 S (J F M).
v. **conoidea** Cless. + 8 S (H W K); 9 (F R).
s.v. **hepatica** Cock. + 6 E (J F M).
sub-fossil. + 6 E (Smith & Musham).

HELIX HORTENSIS Mull. — 2 N; 3 NE; 4; 5 all; 6 W; 7 S; 9; 10 all; 11; 13 all; 14 W; 17 all; 18 all.
The more frequent varietal forms occur generally, and there are single occurrences of:—
v. **fusco-zonata** + 1 (J F M).
v. **fusco-labiata** Taylor. + 8 S (C S C).

Helix hortensis Mull.—*cont.*

v. **roseo-labiata** Taylor. + 15 N (R W).
v. **rufo-zonata** Cock. + 1 (J F M).
v. **pallida** Chll. + 3 SW (J F M).
s.v. **tenuis** Baud. + 11 S (C S C).
sub-fossil. + 6 E (Smith & Musham).

HELIX PISANA Mull. — all.

HELICIGONA ARBUSTORUM Linn. — 10 S; 12; 14 all; 16 N; 16 SE; 17 N; 18 M; 18 E.
v. **albina** Charp. + 3 SW (E A W P); 8 S (C S C); 7 S (J F M); 13 E (W W M).
v. **alpestris** Zgl. + 3 SW; 6 E; 7 S; 8 N; 15 N.
v. **cincta** Taylor. + 3 SW; 6 E; 7 N; 11 N; 13 W.
v. **canigonensis** Boub. + 7 N (W D R); 7S (J F M).
v. **canoidea** West. + 3 SW (E A W P); 8 all (C S C); 13 E (J F M).
v. **flavescens** Fer. Frequent with the type.
v. **fuscescens** D. & M. + 7 S (J F M); 8 S (C S C).
v. **lutescens** D. & M. + 7 S; 15 N; 13 E (J F M).
v. **luteo-zonata** Taylor. + 7 S (J F M).
s.v. **marmorata** Roff. + 8 S (H W K); 13 (C T M).
v. **major** Pfr. + 7 S (J F M).
s.v. **minima** Pfr. + 3 SW (L.N.U.)
s.v. **pallida** Taylor. + 13 W (J F M).
s.v. **poiretia** Moq. Tand. + 13 W (J F M).
v. **rufescens** Moq. Tand. + 7 S (J F M).
sub-fossil. + 6 E (Smith & Musham).

HELICIGONA LAPICIDA (Linn.) + 2 S; 5 W; 6 E; 8 S; 11 all; 15 all; 16 SW.
v. **albina** Men. + 16 SW (T S).
v. **nigrescens** Taylor. + 11 S (V. Howard & Musham).
sub-fossil. + 6 E (Smith & Musham).

HELICELLA VIRGATA (da Costa). — 1; 5 W; 6 W; 8 N; 10 S; 18 W; 18 E.

The commoner varietal forms are frequent where the type occurs. The following also are found:—

v. **alba** Taylor. + 8 S (C S C).

v. **depressa+picturata** Req. + 13 W (J F M) 8 S (C S C).

m. **sinistrorsum** Taylor + 2 NE (T. Ball).

sub-fossil. + 6 E (Smith & Musham).

HELICELLA ITALA Linn = **ericetorum** (Mull.) —1; 2 N; 3 NE; 5 W; 7 all; 10 all; 12; 13 E; 16 SE; 17 all; 18 W; 18 M.

v. **alba** Charp. + 3 SW (E A W P); 8 N (W D R); 8 S (H K W); 15 N; (J H).

v. **grisescens.** + 15 S (R W).

v. **hyalozonata** (Ckll.) + 8 N; 8 S; 15N (J H).

v. **instabilis** (Ziegl.). + 11 S (J. A. Hargreaves).

v. **lutescens** (Van.) + 3 SW (S A); 6 W; 14 E (J F M).

v. **minor** Moq. Tand. + 8 S; 11 N; 11 S; 16W.

v. **obliterata.** + 8 S (H K W); 11 S (J. A. Hargreaves.)

v. **obscura** Moq. Tand. + 4 (J F M).

v. **subdeleta.** + 15 N (J H).

sub-fossil. + 6 E (Welton, W D R); Greetwell, Smith and Musham).

HELICELLA CAPERATA Mort. — 1; 6 W; 10 S; 12; 13 E; 17 all; 18 W; 18 M.

v. **alba** Pic. + 15 N (in Grantham Museum).

v. **bizonalis** Moq. Tand. + 11 S (J. A. Hargreaves).

v. **fulva** Moq. Tand. + 13 W (J F M).

v. **lutescens** Casa. + 8 S (H W K).

v. **major** Jeff. + 8 N (H W K); 8 S; 15 S (C S C).

v. **ornata** Pic. + 2 all; 3 all; 4; 8 all; 9; 13W; 15 N.

HELICELLA HERIPENSIS Mab. + 18 E (Mr. Neaverson, 9.9.13).
sub-fossil. + 6 E (Smith & Musham).

HELICELLA ELEGANS (Gmel.) — all.

HELICELLA ACUTA (Mull.) — all. In 13 W (JFM); one half grown empty shell on G.E. Railway bank-side near Washingboro' Road Bridge. (The aperture was filled with soil in which a slender rootlet had obtained a hold; probably thrown out of a passing train, 18.4.13).

HELICELLA (THEBA) CANTIANA (Mont.) — 4; 6 W; 8 all; 9; 10 S; 11 all; 16 SE; 17 S; 18 all.
v. **alba** Taylor. + 16 N (H W K); 16 SW (W D R).
v. **albo-cincta** Ckl. + 7 S (J F M).
v. **minor** Ckl. + 1; 7 S (J F M).
v. **tenuis** Ckl. + 2 N (E A W P).

HELICELLA (THEBA) CARTUSIANA (Mull.) — all.

HYGROMIA STRIOLATA (Pfr.)=**rufescens** (Mont.) —6 W; 11 S; 12; 14 E; 16 SE; 17 all; 18 M; 18 E.
v. **alba, albo-cincta, rubens**, etc., frequent with the type.
v. **globosa**. + 8 S (C S C).
v. **minor** Jeff. + 2 S (E A W P).

HYGROMIA HISPIDA Linn. — 16 SE.
v. **albida** Jeff. + 10 N (W D R); 13 W (J F M).
v. **albo-cincta** Tay. + 3 SW; 7 S; 8 N; 13 W; 15 S; 16 SW.
=H. **concinna** Jeff. + 7 S; 8 S; 11 N; 11 S; 12; 17 N.
v. **depilata** Alder. + 2 S; 3 SW; 5 E (E A W P).
v. **hispidosa** (Mouss.) + 2 all; 3 SW; 5 E; 6 W; 8 N; 9; 11 N.
v. **nana** Jeff. + 8 S (H W K).
v. **sericea** Drap. + 12 (W D R).
v. **subscalaroides** Baud. + 2 N (E A W P).

Hygromia Hispida Linn—*cont.*

v. **subglobosa** Loc. + 3 NE (Jeff. BC, 1862); 5 W; (F M B); 13 E; (W D R).

v. **subrufa** Moq. Tand. + 2 N; 3 SW; 8 S; 1 O N; 13 all; 14 E; 15 S.

v. **zonata.** + 13 W (J F M).

sub-fossil. + 6 E (Smith & Musham).

HYGROMIA FUSCA (Mont.) + 13 E (J F M); 15 N; (J H).

HYGROMIA REVELATA (Fer.). — all.

ASHFORDIA (HYGROMIA) granulata (Alder.) + 8 S (W D R); 13 E (W W M); (J F M); 15 N; (W D R(16 N; (W D R).

HELICODONTA OBVOLUTA (Mull.) — all.

VALLONIA PULCHELLA (Mull.) — 7 S; 12; 16 SE; 17 S; 18 M.

sub-fossil. + 6 E (Smith & Musham).

VALLONIA COSTATA (Mull.) — 3 NE; 5 W; 6 E; 7 S; 8 N; 11 all; 12; 14 W; 16 SE; 17 all; 18 M.

VALLONIA EXCENTRICA Sterki. + 4 (F. Taylor); 9; 13 all (J F M).

sub-fossil. + 6 E (Smith & Musham).

BULIMINUS (ENA) MONTANUS (Drap.) + 5 W (Mistake).

BULIMINUS (ENA) OBSCURA Mull. — 1; 4; 6 W; 10 S; 12; 14 E; 16 SE; 17 all; 18 all.

v. **albinos** Moq. Tand. + 8 S (C S C); 13 W (J F M pinky white form).

PUPA SECALE Drap. + 2 S (T B); 15 N (R W).

PUPA CINCEREA Drap. — all.

PUPA CYLINDRACEA (da Costa). + 2 S; 3 all; 4; 8 S; 9; 10 N; 11 all; 13 W 15 all; 16 SW.

v. **albina** M.T. + 9 (Rev. W. Fowler; Leeds Conch. Club.)

v. **albina-curta.** + 9 (L C C); 11 N (W D R).

v. **curta** (Westl.) + 9 (J F M).

PUPA ANGLICA (Fer.)=**ringens** Jeff. + 9 (C S C 31. viii. 00).

PUPA MUSCORUM (L.) — 1; 3 NE; 5 W; 6 W; 7 S; 10 S; 14 E; 16 SE; 17 all; 18 all.

v. **albina** Menke. + 9 (C S C).

v. **bigranata** Ross. + 9 (C S C).

v. **brevis** (holocene). + 8 S (C S C).

v. **edentula** (Cless.) + 6 E (A S); 9 (H W K).

sub-fossil. + 6 E (Smith & Musham).

VERTIGO ANTIVERTIGO (Drap.) + 12 (W D R).

VERTIGO SUBSTRIATA (Jeff.) + 13 E (J F M).

VERTIGO PYGMEA (Drap.) + 2 all; 3 SW; 8 S; 9; 11 N; 13 E; 15 all.

sub-fossil. + 6 E (Smith & Musham).

VERTIGO ALPESTRIS Alder. + 15 N (several in Grantham Museum).

VERTIGO MOULINSIANA (Drap.) — all.

VERTIGO LILLJEBERGI Wester. — all.

VERTIGO HELDII Cl. — all.

VERTIGO PUSILLA Mull. — all.

VERTIGO ANGUSTIOR Jeff. + 9 (C S C).

VERTIGO MINUTISSIMA (Hart.) + 4 (E A W P); 9 (id.); 11 S (E. Collier & J F. Burrows).

SPHYRADIUM EDENTULUM (Drap.) + 2 all; 5 E; 3 SW; 8 S; 9; 11 N; 13 W.

v. **columella** Von Mart. + 8 S (C S C).

BALEA PERVERSA (L) + 3 SW; 4; 8 S; 9; 10 N; 11 N; 13 W; 15 N; 16 SW.

v. **simplex**. + 16 SW. (W D R).

CLAUSILIA LAMINATA (Mont). + 2 all; 3 SW; 5 all; 6 E; 7 all; 8 all; 11 all; 13 W; 15 N; 16 SW.

CLAUSILIA BIPLICATA (Mont.) — all.

CLAUSILIA BIDENTATA (Strom.) = **rugosa** (Drap.) + 2 all; 3 SW; 5 W; 6 W; 7 N; 8 all; 9; 10 N; 11 all; 13 all; 14 E; 15 all; 16 SW.

m. **dextrorsum** Jeff. + 3 W (E A W P).

v. **everetti** Miller. + 8 S (C S C); 7 N (S A); 15 all (R W).

v. **gracilior** Jeff. + 3 SW (E A W P).

v **tumidula** Jeff. + 16 SW (E. Collier).

CLAUSILIA CRAVENENSIS Tay. — all.

CLAUSILIA ROLPHII Turton. + 7 N (S A 1905); 8 S (H W K, 1887); 11 N (J B D); 15 all (J H).

OPEAS GOODALLI (Mull.) — all.

OPEAS CLAVULUS (Fer.) — all.

OPEAS URICHI (Sm.) — all.

SUBULINA OCTONA (Ch.) — all.

AZECA TRIDENS Pult. + 7 N (A S); 8 S (C S C); 16 N (Peacock & Stow.)

v. **nouletiana** Dup. + 8 S (C S C).

COCHLICOPA (ZUA) LUBRICA (Mull.) — 5 W; 17S; 18 M; 18 E.

v. **alba** — 13 W (J F M).

v. **exigua** Menke. + 15 N (Grantham Museum).

v. **fusca** M.T. + 2 N (C S C); 8 S (C S C).

v. **lubricoides** (Fer.) + 3 SW 8 S; 9; 13 W; 15 all.

v. **minor** + 9 (H K W).

v **ovata** Jeff. + 3 SW (L N U); 9 (C S C); 15 N (R W); 13 W (J F M)

sub-fossil. + 6 E (Smith and Musham.)

CAECILIOIDES ACICULA (Mull.) + 1; 2 all; 3 SW; 4; 5 E; 6 E; 8 S; 13 all; 15 all.

SUCCINEA PUTRIS (L.) — 6 E; 7 S; 8 N; 10 S; 18 E.

v. **vitrea** (Moq. Tand.) + 7 S; 13 W; (J F M).

SUCCINEA ELEGANS Risso. — 1; 3 NE; 5 E; 6 all; 7 N; 14 E; 16 SW; 16 SE; 17 N; 18 M; 18 E.

SUCCINEA OBLONGA Drap. — all.

CARYCHIUM MINIMUM Mull. + 2 all; 3 SW; 4; 5 all; 6 E; 7 all; 8 all; 9; 11 N; 12; 13 all; 14 E; 15 all; 16 SE.

sub-fossil. + 6 E (Smith & Musham).

CYCLOSTOMA ELEGANS (Mull.) + 3 SW; 6 E; 8 S; 10 N; 11 all; 13 W (dead); 15 all.

v. **ochroleuca** Moq. Tand. + 8 C (C S C).

v. **pallida** Moq. Tand. + 11 S (Howard and Musham).

sub-fossil. + 6 E (H P).

ACICULA LINEATA (Drap.) — all.

LIMNAEA STAGNALIS (L.) — 3 NE; 5 E; 6 W; 7 N; 8 N; 10 S; 11 S; 12; 14 all; 17 N; 18 all.
v. **charpentieri** Cless. + 4 (F. Taylor).
v. **elongata.** + 15 N (R W).
v. **fragilis** (L.) + 3 SW; 4; 5W; 6E; 9; 11 N; 12 E; 13 W; 15 N.
v. **turgida.** + 4 (F. Taylor).

LIMNAEA PALUSTRIS (Mull.) — 2 all; 4; 7 N; 8 N; 10 N; 14 W; 16 SW; 17 N; 18 E.
v. **albida** Nels. + 8 S (Roebuck & Kew).
v. **elongata** (Jeff.) + 6 E; 7 S (J F M).
v. **lacunosa** (Zgl.) + 13 W (J F M).
v. **minor** Tay. + 6 E (J F M).
v. **roseo-labiata** (Jeff.) + 7 S (J F M); 11 S (J A H); 12 (W D R).
v. **schleochii** Cless. + 6 E; 7 S (J F M).
v. **tincta** (Jeff.) + 12 (W D R); 13 E (J F M).

LIMNAEA TRUNCATULA (Mull.) — 3 NE; 5 W; 6 E; 10 N; 15 S; 16 N; 16 SE; 17 S; 18 W; 18 E.
v. **major** Moq. Tand. + 14 W (W D R).
sub-fossil. + 6 E (Smith & Musham); an example with a very deep suture (W D R); + 13 E (J F M).

LIMNAEA PEREGRA (Mull.) — 18 E.
v. **acronica** (Stud.) + 13 W (J F M).
v. **acuminata** (Jeff.) + 6 E (Smith and Musham); 11 N (H W K).
v. **acuta** (Reeve.) + 13 W (J F M).
v. **acuta** (Tay.) + 6 E (Smith & Musham)
v. **alpestris-minor** (Cless.) + 13 W (J F M).
v. **amplæformis** (Kob.) + 13 W (id.)
v. **ampullaria** (Rossm.) + 13 W (id.)
v. **ampullaria-minor** (id) + (id.)
v. **boisii** (Dup.) + 13 all (J F M)
v. **croatica-minor** (Zgl.) + 13 W (id.)
v. **curta** (Cless.) + 7 S (id.)
v. **diaphana** (Parr.) + 13 S (id.)
v. **diaphana** (Zgl.) + 7 S (id.)

Limnaea peregra—*cont.*

v. **fontinalis** (Cless.) + 4 (F. Taylor); 13 all (J F M).
v. **fontinalis** (Stud.) + 7 S; 13 E (J F M).
v. **heldii** (Cless.) + 13 W (id.)
v. **inflata** (Kob.) + (id.)
v. **inflata–minor** (Kob.) + (id.)
v. **labiosa** (Jeff.) + 4 (F. Booth); 15 N (R W).
v. **lacustris** (Leach.) + 9 (J F M).
v. **lacustrina** (Cless.) + 7 S; 9; 13 all (id.)
v. **lineata** (Bean.) + 7 S; 13 W (J F M); 8 S (C S C); 15 N (R W).
v. **maritima** (Jeff.) + 4 (Hild. Friend); 13 E (W D R).
v. **microcephala** (Kuster) + 13 W (J F M).
v. **microcephala** (Vistr.) + 7 S (id.)
v. **oblonga** (Jeff.) + 5 W (F B); 8 S (C S C); 13 W (J F M); 15 N (R W).
v. **ovata** (Drap.) + 4; 5 W; 8 S; 9 S; 10 N; 11 N; 13 W; 14 E; 15 N; 17 N.
v. **ovata–minor** (Drap.) + 13 W (J F M).
v. **patula** (Da Costa) + 13 W (id.)
v. **picta** (Jeff.) + (id.)
v. **piana–minor** (Hazay). + (id.)
v. **vulgaris** (Moq. Tand.) (id.)
Var. nov., a form with almost white animals, lip, and columella. + 9 (id.)

LIMNAEA AURICULARIA (L.) + 1; 3 SW; 4; 5 E; 6 E; 7 all; 8 S; 9; 10 S; 11 all; 13 all; 15 all; 16 SE; 18 M (dead.)
v. **acuta** (Jeff.) + 9; 13 W (J F M).
v. **acutalis–major** (Morelet). + 13 W (id.)
v. **albida** (Jeff.) + 13 E (J F M); 15 N (R W); 16 SW (T. Gelstrop).

LIMNAEA BURNETTI Ald. — all.

LIMNAEA INVOLUTA Haw. — all.

LIMNAEA GLABRA (Mull.) + 2 N (Dr. Wallace); 2 S (J. Beaulah); 13 W (Canon W. W. Fowler).
v. **elongata** (Jeff). + 2 N (W D R).

AMPHIPEPLEA GLUTINOSA (Brug.) + 9 (C. S. Carter and H. W. Kew).

PHYSA FONTINALIS (L.) — 5 W; 7 all; 8 N; 14 W; 15 S; 17 N; 18 E.

v. **curta** (Jeff.) + 8 S (C S C).

APLEXA HYPNORUM (L.) + 1; 3 SW; 4; 5 W; 8 S; 9; 10 S; 11 N; 12; 13 W; 14 E; 17 S; 18 all.

m. **angulatum.** + 3 SW (T. Ball).

v. **minor.** + 1 (J F M).

PLANORBIS CORNEUS (L.) + 1; 2 S; 3 SW; 5 W; 6 E; 7 all; 8 S; 9; 11 N; 13 W; 14 E; 15 N; 16 N; 16 SE; 17 S; 18 W.

v. **albina** (Moq. Tand.) + 7 S (J F M); 13 W (J. Hardy)

PLANORBIS ALBUS (Mull.) — 3 NE; 5 W; 6 W; 11; 12; 14 SW; 15 S; 16 SW; 17 all; 18 all.

PLANORBIS GLABRA (Jeff.) — all.

PLANORBIS NAUTILEUS (L.) = **crista** (L.) + 2S; 3 SW; 5 all; 7 N; 8 S; 10 S; 11 N; 12; 13 all; 14 W; 17 N; 18 E.

v. **crista** (L.) + 8 S (C S C); 14 W (Roebuck & Musham)

v. **imbricata.** + 3 SW (E A W P); 12 (W D R).

v. **laevigata** (Ad.) + 3 SW (E A W P); 8 S (W. Markham).

v. **spinulosa** (Cless.) + 2 S (C. F. George).

PLANORBIS DILATATUS (Gould). — all.

PLANORBIS CARINATUS (Mull.) — 3 NE; 8 N; 12; 14 W; 18 N; 18 E.

v. **disciformis** (Jeff.) + 15 N (R W).

PLANORBIS UMBILICATUS (Mull.) — 3 NE; 5 E; 10 all; 14 W; 15 S; 16 SW; 18 E.

v. **albina** (Jeff.) + 7 S (J F M).

v. **rhombea** (Turt.) + 9 (Rhodes & Carter); 11 N (B. S. Dodd).

m. **subscalariforme** + 9 (Crow & Carter).

m. **terebrum.** + 17 S (H W K).

PLANORBIS VORTEX (L.) — 3 NE; 5 W; 14 W; 17 N; 18 M; 18 E.
v. **compressa** (Mich.) + 13 W (J F M).

PLANORBIS SPIRORBIS (L.) — 5 all; 10 W; 11 S; 14 E; 16 N; 16 SW; 18 E.
v. **leucostoma** (Tay.) + 7 N (E A W P); 12 (Burchnall & Musham).
v. **rotundata.** + 2 N (Roebuck & Musham).

PLANORBIS PARVUS Say. = **glaber**, Jeff. — all.

PLANORBIS CONTORTUS (L.) — 5 W; 7 S; 10 S; 11 S; 12; 14 W; 16 SW; 17 N; 18 M; 18 E.

PLANORBIS FONTANUS (Light.) + 2 S; 3 SW; 4; 5 E; 6 all; 7 N; 8 S; 9; 10 N; 11 N; 13 W; 14 E; 16 N; 16 SE.
v. **albina** (Nels.) + 6 E (J F M).

SEGMENTINA NITIDA (Mull.) + 3 SW (J Beaulah); 5 W (F W F); 9 (Miss Longley); 17 S (W D R).

ANCYLUS FLUVIATILIS (Mull.) + 8 S (H W K); 11 N; 15 all (RW).

ACROLOXUS LACUSTRIS (L.) + 2 S; 3 SW; 4; 6 E; 9; 10 N; 11 N; 13 all; 15 S; 16 SW.

VIVIPARA CONTECTUS (Mull.) — 2 N; 3 NE; 4; 5 all; 7 N; 8 N; 10 all; 14 W; 16 SW; 17 N; 18 W; 18 E.
m. **scalariforme.** + 6 W (J F M).
v. **virescens** (Jeff.) + 3 SW (T. Ball).

VIVIPARA VIVIPARA (L.) + 1; 5 W; 6 all; 7 S; 10 S; 13 all; 15 all.

BYTHINIA TENTACULATA (L.) — 3 NE; 14 W; 18 E.
m. **decollatum** (Jeff.) + 9 (E A W P).
v. **excavata** (Jeff.) + 10 S (C S C); 11 S (J. A. Hargreaves).
v. **picta** (Tay.) + 13 W (J F M).
v. **producta** (Menke). + 11 N; (J E M) 7 S (J F M).

BYTHINIA LEACHII (Shepp.) — 2 N; 3 NE; 4; 5 E; 7 all; 8 all; 10 S; 12; 14 W; 16 SW; 18 E.

Decollated forms of this species. + 9 (Leeds Conchological Club, 1906).

VALVATA PISCINALIS (Mull.) — 3 NE; 4; 5 W; 12; 14 W; 18 all.

v. **antiqua** (Sow.) + 10 S (Roebuck & Musham).

VALVATA CRISTATA (Mull.) — 1; 2 N; 5 W; 7 S; 10 S; 11 S; 13 E; 15 S; 16 SW; 17 N; 18 W; 18 M.

ACICULA LINEATA (Drap.) — all.

NERITINA FLUVIATILIS (L.) + 2 S; 3 SW; 6 all; 7 S; 13 W; 17 S.

v. **cerina** (Colb.) + 13 W (a mistake)

v. **trifasciata** (Colb.) + 3 SW (E A W P); 13 W (J F M).

PELECYPODA.

UNIO TUMIDUS Phll. + 1; 2 S; 5 W; 6 all; 7 S; 8 S; 10 S; 13 all; 15 all.

v. **arcuata.** + 5 W (G. Roberts).

v. **radiata** (Colb.) + 5 N; 6 E (id.)

v. **ovalis** (Mont.) + 6 E (id.)

UNIO PICTORUM (L.) + 1; 2 S; 3 SW; 5 W; 6 all; 7 all; 8 all; 10 S; 13 W; 15 all.

v. **compressa** (Jeff.) + 7 N (J F M); 8 S (C S C); 13 W (J F M).

v. **curvirostris** (Norm.) + 5 W (G. Roberts).

v. **flavescens** (Moq. Tand.) + 7 S; 13 W (J F M).

v. **rostrata.** + 5 W (G. Roberts).

UNIO MARGARITIFER (L.) — all.

ANODONTA CYGNEA (L.) + 2 S; 3 SW; 5 W; 6 all; 7 S; 8 all; 9; 10 S; 11 N; 13 all; 15 all.

v. **arenaria** (Sch.) + 13 W (J F M); 15 S (H P).

v. **diminuta** (Cless.) + 8 S (H W K).

v. **incrassata** (Shepp.) + 8 S (C S C).

v. **piscinalis.** + 7 S; 13 W; (J F M).

Anodonta cygnea—*cont.*

v **radiata** (Mull.) + 8 S (C S C); 15 S (Stow & Musham).

v. **rostrata** (Rossm.) + 8 S (H W K).

v. **zellensis.** + 8 S; 11 N (W D R); 13 E (J F M).

v. **anatina** (L.) + 1; 2 S; 3 SW; 5 W; 6 E; 7 S; 8 S; 9; 10 S; 11 N; 12; 13 W; 15 N; 17 N.

DREISSENSIA POLYMORPHA (Ben.) + 2 S; 3 SW; 6 all; 7 S; 10 N; 13 all; 15 all; 17 N.

v. **angusta** (Colb.) + 13 W (J F M).

v. **dilatata** (Colb.) + (id.)

SPHAERIUM RIVICOLA (Leach.) + 2 S; 3 SW; 5 W; 6 all; 7 S; 10 S; 13 W.

SPHAERIUM CORNEUM (L.) — 11 S; 12; 14 W; 17 N; 18 all.

v. **flavescens** (M'Gill.) + 3 NE; 13 E (J F M).

v. **nucleus** (Stud). + 13 W (J F M); 15 N; (R W); 17 S (H W K).

v. **nucleus.** + **flavescens.** + 6 W (W D R).

v. **regularis** (Pasc.) + 13 W (J F M.)

v. **scaldiana** (Norm.) + 3 SW (E A W P).

An example on tarsus of Dyticus marginalis + 7 S (H W K).

SPHAERIUM LACUSTRE (Mull.) — 2 N; 6 E; 7 N; 8 N; 10 S; 11 S; 14 all; 15 all; 16 SW; 16 SE; 17 all; 18 all.

v. **brochoniana** (Bourg.) + 9 (H W K); 13 W (J F M).

v. **ovalis** (Fer.) + 13 W (J F M).

v. **ryckholtii** (Norm.) + 9 (H W K)

SPHAERIUM PALLIDUM Gray. + 3 SW (J. Beaulah).

PISIDIUM AMNICUM (Mull.) + 1; 3 SW; 4; 5 E; 6 all; 7 S; 8 S; 9; 10 N; 11 N; 13 all; 16 SW; 16 SE.

v. **flavescens** (Moq. Tand.) + 13 W (J F M).

v. **striolata** (Baud.) + (id.)

PISIDIUM SUPINUM (Sch.) = **conicum** (Baud.) + 13 W (J F M).

PISIDIUM HENSLOWANUM (Shepp.) + 2 all; 3 SW; 5 E; 6 E; 7 all; 13 W; 14 W; 15 N.

PISIDIUM FONTINALE (Jeff.) — 2 N; 3 NE; 5 W; 6 W; 8 N; 10 S; 11 S; 12; 14 all; 15 all; 16 SW; 17 all; 18 W; 18 M.

PISIDIUM SUBTRUNCATUM Malm. + 6 E; 7 S; 8 S; 9; 13 E; 13 W; 15 S.

PISIDIUM PULCHELLUM (Jenyns). + 10 N (Smith and Musham); 13 W (J F M).

PISIDIUM PUSILLUM (Gmel.) — 1; 3 NE; 5 W; 10 N; 11 S; 12; 14 W; 15 N; 16 N; 16 SE; 17 all; 18 all.

v. **striata** (Taylor.) + 9 (C S C).

PISIDIUM CINEREUM Alder. + 5 E (Roebuck and Musham).

PISIDIUM OBTUSALE (Pfeiff.) + 4; 6 E; 7 all.

PISIDIUM NITIDUM Jen. + 3 SW; 4; 7 S; 8 S; 9; 8 S; 9; 11 N; 12; 13 all; 14 E; 17 S.
11 N; 13 all; 14 E; 15 all.

PISIDIUM MILIUM Held. + 3 NE; 5 E; 6 E; 7 S; 8 S; 9; 10 all; 13 E; 14 E; 16 SW.

PHYTIA MYOSOTIS (Drap.) + 4 (A S); 9 (Kew and Carter); 11 S (A S; Fred Taylor).

OVATELLA BIDENTATA (Mont.) — all.

PALUDESTRINA CONFUSA (Fr.) + 9 (F. Rhodes).

PALUDESTRINA JENKINSI (Smith). + 3 NE; 4; 5 W; 9; 12.

v. **carinata** (Sm.) + 4 (A S); 9 (Carter & Smith).

PALUDESTRINA TAYLORI (Smith). — all.

PALUDESTRINA VENTROSA (Mont.) + 3 NE (H W K); 3 SW (id); 9 Carter and Smith).
PALUDESTRINA STAGNALIS (Bas.) = **ulvae** (Penn.) + 4; 9; 11 S; 12; 18 E.
v. **albida** Jeff. + 11 S (Dodd & Marshall).
v. **barleii** Jeff. + 11 S (id.)
PSEUDAMNICOLA anatina (Drap). — all.
ASSIMANIA GRAYANA (Leach). + 4; 11, dead shells (A S).

A BIOLOGICAL PUZZLE.

One day in December I noticed an iridescent scum on the top of some water and thinking it to be oil, dipped my stick into it to try and find out its quality. Instead of oil, the stick became coated with a mass of seed-like bodies. These, on examination with a 1-in. lens, proved to be most interesting microscopic objects. The "seed" consisted of two cell-cases lying in a plane of thin transparent membrane, joining and surrounding the two sacs like a horny wing. The surface of the cell-like bodies was covered by irregularities which, breaking up the illuminating top-light, gave a very beautiful slide. Finding it to be so interesting an object for the microscope, I went next day for a further supply, but was disappointed, as nearly all had gone, but their place was taken by a small single seed-like body not having a winged belt.

I have submitted specimens to various Botanical friends, but they have invariably been puzzled. The Biologists were then tried, and from them I learn that they are either *statoblasts*—the winter eggs of a species of fresh-water Bryozoa, or *ephippia*—egg-cases of a species of Daphnia (water flea).

It is a Biological question in which I am much interested and I will send a more complete "note" to the L.N.U. Transactions later on. In the meantime I have a large number of both varieties under cultivation and if any reader cares for a sample, I shall be pleased to supply.

Henry Preston.

BLACKBIRDS AND SONG-THRUSH HYBRIDS.

I have heard of these in wild nature, as well as in aviaries, but I have ever been sceptical up to date, not unnaturally, as I have never observed any circumstances which pointed to hybrids. On 9/1/1920, I watched for some time a male Blackbird courting a female Song-Thrush with its usual comical love-display, that "of an old hand," as our phrase is. The female seemed quite indifferent, if not repugnant, to these alien antics, and finally, apparently to escape them, flew into the covert of a shrubbery at hand, into which the Blackbird as promptly followed her. For the time being I lost sight of them; but as I know the beat and ordinary purview of both I shall follow them up later. Since the prolonged snow-frosts of the winters of 1916-17 and 1917-18, the supply of *Turdi* here at Cadney has been much curtailed in numbers, as I pointed out in *L.N.U. Transactions*, v. IV, pp. 87—92. This is still specially the case with the Song-Thrush, but the Blackbirds too suffered terribly in numbers, and have not yet fully recovered from those cruel seasons. By daily noting since the snow-frosts of 1917—18 departed, I have made out that there are three males for every two females of *Turdus merula*. What the proportion of sexes is in the Song-Thrush, I have been quite unable as yet to estimate, as from my diary I find on an average I have not seen more than one specimen of either sex per fortnight during the last twenty months. In the winter months also they leave the centre of the parish, where Cadney village stands, and where most of my observations are made, for its beck- sides to feed on the Banded Snail (*Helix nemoralis*). E. Adrian Woodruffe-Peacock, Cadney, Brigg, 10/11/920.

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